SOUTHERN POWER AND INDUSTRY

JULY, 1956

Southern Power & Industry provides information that will help solve design, installation, maintenance and operating problems of engineers and executives in manufacturing, processing, service and power plants in the South and Southwest.

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FIFTY CENTS PER COPY

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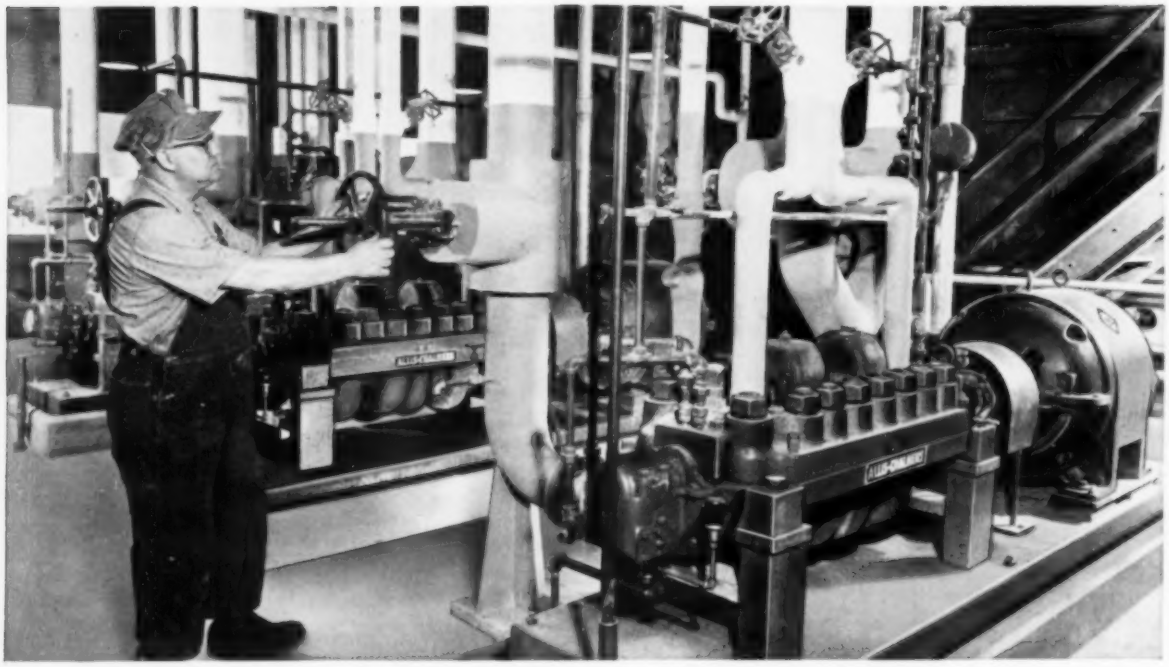
THE GENERAL ENGINEER . . 56

A frank discussion of the plant engineer's responsibilities and relationships that should improve his performance and raise his standing in the industrial organization.

Allis-Chalmers Pumps Meet Power Plant Requirements



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As new members of the Allis-Chalmers complete line of pumps, these units are designed to meet medium-high pressure, continuous service requirements of boiler feed duty in lower volume ratings.

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Allis-Chalmers is the only company that can offer you "One-Source" responsibility, with a complete unit — pump, motor and control — all built to work together. For "MORE" information about Allis-Chalmers pumps, call your local A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

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A-5098

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Volume 74 Number 7

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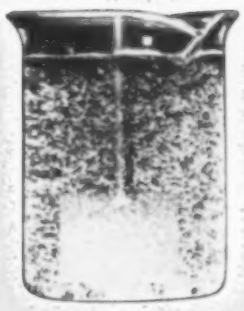
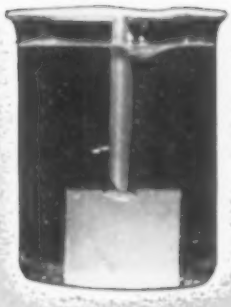


Alum



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For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

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Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

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SOUTHERN POWER AND INDUSTRY

Vol. 74
No. 7

JULY, 1956

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

July 1, 1956

◆ BUILDING VOLUME CUT 40%—Design features of South Carolina Electric & Gas Company's Silas C. McMeekin Station are highlighted in this issue by G. L. Dibble, Manager of Production and Transmission. First of four units is scheduled for operation in eary 1958.

Design features include 2400 psi controlled circulation boiler and a 125,000 kw cross compound, axial exhaust turbine.

Results—Smaller building volume . . . lower boiler . . . compact arrangement . . . fewer operators . . . shorter piping and cables . . . 89.55% boiler efficiency . . . lower heat rate than conventional plant.

◆ CUTTING & BEVELING MACHINE by H & M Pipe Beveling Machine Company of Tulsa, Oklahoma, is designed for small diameter pipe—1 1/2" to 4". Heretofore, hand cutting and beveling of pipe of less than 4" diameter has often resulted in reduced operations and imperfect cuts and bevels, or had to be done by a pipe machine in a shop. The new H & M Model O is completely portable—7 1/2 lb—and assures perfect, square bevels.

In Yorktown, Texas, a 20-mile pipeline was recently taken up, reconditioned, and rebevelled. Line consisted of over 100,000 ft of 2" and 3" pipe, to be cut into 40' lengths. 2,700 joints had to be cut, with two bevels to each joint.

Operators completed 5,500 bevels in ten 9-hour days, using the H & M machines. It is reported that as high as 660 cuts in one day were made by a single machine.

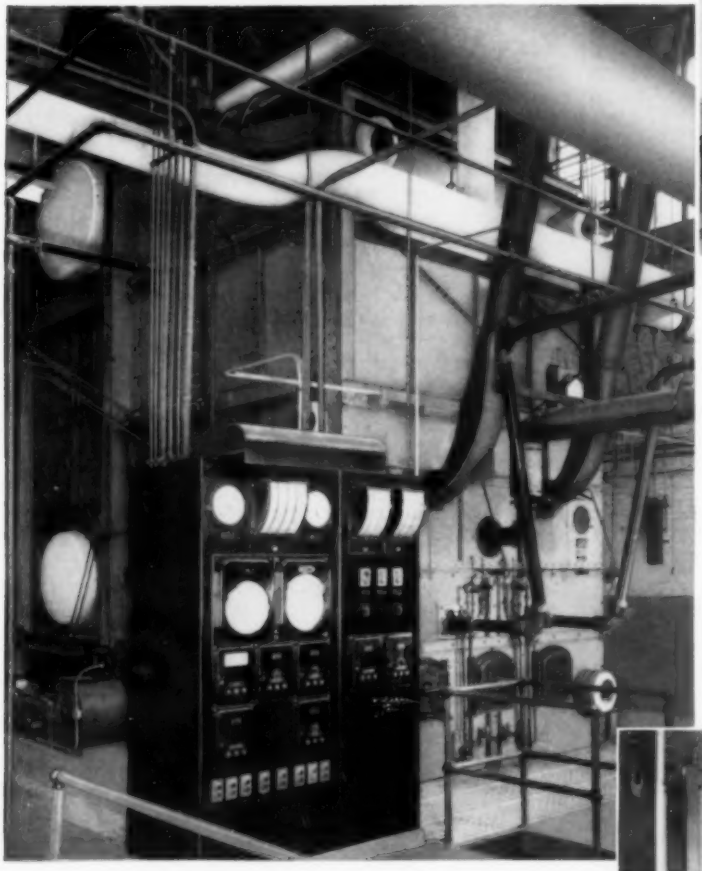
◆ AN OVERLOAD WARNING SIGNAL is the latest attachment being offered by Lamson Mobilift Corporation for its Sit-Down industrial trucks. Attachment warns the driver either by a signal light or bell (optional) that the load he has just picked up is in excess of the safe operating capacity of his truck. Overload signal will also warn driver when his load has shifted to a dangerous position.

◆ METAL SURFACING MATERIAL by Durametallic Corporation provides superior sealing surface for mechanical seals. The #55 Facing Material is recommended for extremely low to extremely high temperatures, and for use in sealing all chemicals with exception of hot strong caustics and some fluorine compounds.

◆ 1,000,000 KW GENERATING PLANT, to be built on the Coosa River in Alabama, will be owned jointly by the Georgia Power Company and the Alabama Power Company. First installation will consist of two 250,000 kw units, representing an initial investment of about $75 million. Operation is scheduled for 1961. Two additional units are expected to be installed in 1963. Plant will be built and operated by a new company known as Southern Electric Generating Company. Georgia Power and Alabama Power will share equally in the output of the new plant.

(Continued on page 6)

KEELER TYPE M-K STEAM GENERATOR SERVES G-E CABINET PLANT

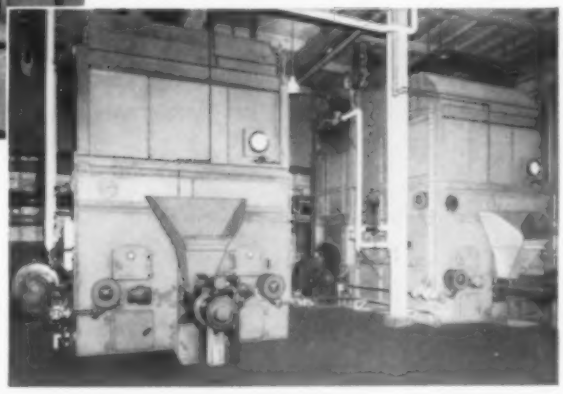


General Electric Company
Illinois Cabinet Works
Rockford, Illinois

KEELER

TYPE M-K

All purpose cross drum water tube type steam generators provide high efficiency with any method of firing—for coal, oil, gas or waste fuel operation (or combinations), with ready convertibility.



In modernizing the power plant of its Illinois Cabinet Works, the General Electric Company selected the Keeler Type M-K Steam Generator pictured above to supply low cost steam for its process and heat requirements.

The unit has a rated capacity of 35,000-lbs. of steam per hour and a 200 psi design pressure. This is a coal fired operation, of the automatic over-fired, spreader type with provision for conversion. The complete Keeler installation includes all burning equipment, controls, safety devices and accessories.

Keeler Type M-K Steam Generators provide the efficiency of bent tube construction with fast water circulation. A Keeler modernization of old and proven techniques, they feature a compact design that prevents excessive radiation losses with water cooled, completely steel encased and insulated furnace walls and roof.

The Type M-K is made in capacities from 12,000 to 150,000-lbs. of steam per hour with a standard design pressure of 160 psi, a maximum design pressure of 500 psi and a total maximum steam temperature of 750° F. These generators can be operated at high ratings and high efficiency with any firing method, for burning coal, oil, gas, waste fuel as well as combinations, and include provision for ready convertibility.

The list of Keeler Type M-K installations reads like "Who's Who of American Business and Industry" . . . including aircraft, automotive and chemical plants, universities, hospitals and central heating plants. The two unit photo immediately above shows a recent installation in a large mid-western college.

Write or phone for complete information . . . there's a Keeler representative at your service in your locality.

The Seal of Quality in Water Tube Boilers

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No. MK-1: Type MK Boilers
No. DK-1: Type DK Package Boilers
No. F-14: Type CP Package Boilers
No. M-2A: Type CPM Package Boilers

KEELER WATER TUBE *Boilers*

— ESTABLISHED 1864 —

E. KEELER CO.

WEST & CHURCH STS. • WILLIAMSPORT, PA.

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Facts and trends *(continued from page 4)*

- NEW WELDING ADVISORY SERVICE is being offered by Eutectic Welding Alloys' District Engineers. Survey results of present and possible welding applications, highlighting operations where metal joining, machinery repair and overlaying for wear resistance can be increased profitably, provides purchasing agent, shop foreman, or welder with a program for improving welding results. New service details are given in Procedure TIS 2600—write Eutectic at 40 172nd St., Flushing 58, New York.

- DEEP-CORRUGATED ALUMINUM JACKETING by Childers Manufacturing of Houston, Texas, makes it possible to do an all-aluminum jacketing job on nearly any tank, tower or vessel. Jacketing may be attached with aluminum strapping and seals, or with aluminum sheet metal screws. Rigidity of new jacketing, available with 1 1/4" or 2 1/2" corrugations, is increased by cross crimping the aluminum before adding the deep corrugations. Cross crimping adds up to 97% greater strength over plain corrugated aluminum.

- POWER-DRIVEN NAILERS by Atlanta's Auto-Nailer Company range in utility from the nailing of the most delicate moulding, to nailing 2 by 4's and heavier stock. Nail sizes range from 20 gage to 13 and lengths from 1/4" to 2 3/4".

  Auto-Nailers will cut blunt, needle-point or headed nails; will clinch or brad the points, if desired, when total thickness of the work is within length limitations. They will countersink the heads or can start nails for later hand driving. Controls permit quick changes in type of work, height of "anvil" table, length of nail, countersink or flush. Units, cutting their own nails as they operate, will drive up to 3-nails-a-second.

- AUTOMATIC NAIL PULLER by The Bellows Co. of Akron, Ohio, removes nails from crates, boxes, lumber, etc., in a fraction of a second. One man equipped with this hand tool can do work equivalent to that of three or four men using ordinary methods. Tool weighs only 10 lb.

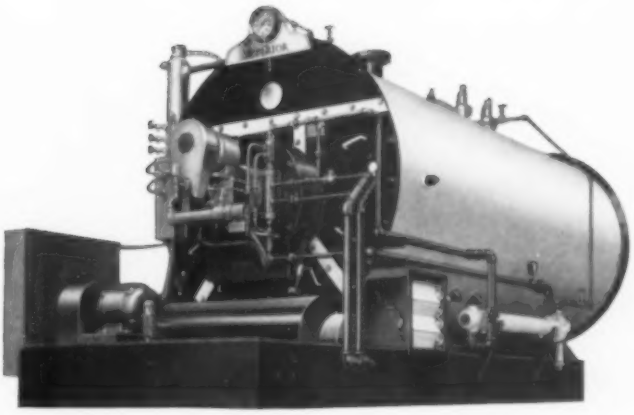
- MAINTENANCE REPAIR TECHNIQUE—The hazards and difficulties in making welded repairs to metal tanks, pipes, conduit, etc., have long been troublesome. This is especially true where flammable materials are being handled and complete evacuation of all liquids, gasses, or powders becomes necessary before welding can be started.

  New repair technique, developed by Smooth-On Manufacturing Co., employs a filled epoxy resin material called Sonite and glass cloth. Patches made with the compound have been tested to over 1,000 psi for extended periods without failure. It is claimed to withstand temperatures up to 200 F. Check "Equipment . . . Supplies . . . and Methods" in this issue for details.

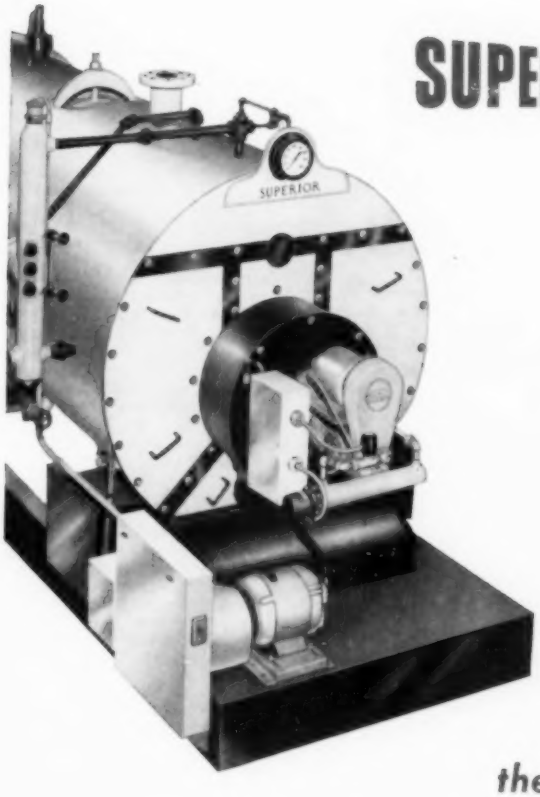
- MAINTENANCE AND PRODUCTION PLANNING, like all other engineering, involves thorough study of available technical literature on the subject. Most recent information on new products and equipment is to be found in manufacturers' news releases and bulletins. Latest bulletins, catalogs,etc., in the industrial and power field are briefed on pages 16-19. Check over the listings, and then use SPI's reader service to obtain your free copies. See coupon on page 17.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.

CLEANER
QUIETER
SAFER



. . . and built for years of extra service



SUPERIOR STEAM GENERATORS are the only packaged units with an integrated and built-in *induced* draft system (as shown at the left).

Superior's induced draft maintains a negative pressure in all 4 passes of the boiler as well as in the combustion chamber eliminating the need of spring-loaded pressure relief doors commonly used on forced-draft types, and eliminating the forcing of dirt, soot or combustion gases into the boiler room.

The multiple fans operating at lower tip speeds also eliminate much of the noise and the high speed "whine" found where high speed turbines are used.

A very important advantage of Superior's *induced* draft system is in the evenness of its draw across all of the tubes in the fourth pass. This even distribution of the hot gases eliminates the danger of overworked or burnt out tubes and adds years to the life of the boiler.

Superior Steam Generators are built in 18 sizes from 20 to 600 b.h.p. for pressures to 250 p.s.i. burning oil or gas or both.

Write today for Catalog 811 F

the most rugged and dependable packaged fire tube boiler made . . .

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
STEAM GENERATORS

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is what you buy...

When you invest hundreds of thousands of dollars in a cooling tower, what you are actually buying is the tower's consistent ability to deliver *cold water* at specified temperature and volume . . . at an economical price per gpm.

And because actual performance is an "unknown" until the tower is in operation, you purchase cooling towers largely on faith in the manufacturer.

You can place your absolute confidence in The Marley Company's ability to deliver the cold water you specify. At Marley, water cooling has been an exclusive specialization—not a sideline—for 35 years. Every company facility—design, research, engineering, production—is devoted 100% to the science and techniques of water cooling. This single-minded approach to water cooling problems has resulted in Marley's undisputed leadership in the water cooling field by any standards you care to apply.

The Marley Company, however, does not ask you to buy its cooling towers on blind faith. Rather, Marley urges every industrial tower owner to test his tower and has paved the way by developing the simplest and most authoritative tower-testing procedure. And finally, every Marley cooling tower, from the moment it starts, receives the benefit of professional observation and inspection by Marley field engineers—specialists in maintaining both tower function and tower structure in excellent condition.

The Marley Company
Kansas City 14, Missouri

MARLEY

FUTURE EVENTS
of Engineering Interest

Sept. 14-15; 38th Annual Meeting, **Public Utilities Association of the Virginias,** Greenbrier Hotel, **White Sulphur Springs, W. Va.** Estimated attendance 400.

Sept. 23-26; Petroleum-Mechanical Engineering Conference, A.S.M.E., Conrad Hilton Hotel, **Dallas, Texas;** C. E. Davies, Secty., A.S.M.E., 29 West Thirty-Ninth St., New York 18, N. Y.

Sept. 27-29; 33rd Annual Meeting, **National Management Association,** Sheraton-Jefferson Hotel, **St. Louis, Mo.** National Management Assoc., 321 West First St., Dayton 2, Ohio.

Oct. 1-3; 12th Annual Meeting, **National Electronics Conference,** Hotel Sherman, **Chicago, Ill.** Estimated attendance, 10,000, for the nation's leading forum on electronic research, development and application. Victor J. Danilov, Illinois Institute of Technology, Chicago 16, Ill.

Oct. 22-25; Society of Industrial Packaging and Materials Handling Engineers technical short course (Oct. 22-25), 11th Annual National Protective Packaging and Materials Handling Exposition (Oct. 23-25), and National Protective Packaging and Materials Handling Competition, Kiel Auditorium, **St. Louis, Mo.;** G. Cornwall Spencer, 30 N. La Salle St., Chicago 2, Ill.

Oct. 22-26; 44th National Safety Congress and Exposition, Chicago, Ill. Sessions on industrial safety scheduled for Conrad Hilton, Congress, Morrison and La Salle hotels; traffic safety sessions, Congress; commercial vehicle and transit safety sessions, La Salle; farm and school sessions, Morrison; and home safety sessions, Conrad Hilton. R. L. Forney, secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Oct. 23-26; Symposia are planned on utilities industry, high temperatures, transportation industry, cathodic protection, pipe lines and oil and gas well equipment; **National Association of Corrosion Engineers,** South Central Region, Gunter Hotel, **San Antonio, Texas;** A. B. Campbell, Executive Secretary, National Assoc. of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas.

Nov. 26-30; Third International Automation Exposition, Trade Show Building, 500 Eighth Ave., **New York.** Clinics on: electronic computers, process automation, machine tool automation, office automation, automatic materials handling (conveyors), servomechanisms, electromechanical components and electronic components. Harrison Gilmer, 908 Keystone Building, Pittsburgh 22, Pa.

USE SPI READER SERVICE

See Service Cards Pages 17 & 18

Owner: First Security Building Company, Salt Lake City
Architect: Bank Building and Equipment Corporation, W. G. Knoebel, registered architect, St. Louis, Mo.
Associate Architect: Slack W. Winburn, Salt Lake City
General Contractor: Utah Construction Company, Salt Lake City
Heating and Air Conditioning Contractor: Larsen and Company, Salt Lake City
Spang Distributor: N. O. Nelson Company, Salt Lake City

SPANG CW Steel Pipe handles the complete heating and air conditioning system in the new $3,000,000 First Security Bank Building at Salt Lake City, the first major building in Utah to use "skin-type design" construction.

"We know SPANG CW PIPE will give top service"

says Dick Brown, Manager,
Larsen and Company, Salt Lake City, Utah

That's the word from the man who is responsible for installing the heating and air conditioning system in the new First Security Bank Building at Salt Lake City, Utah. SPANG CW Steel Pipe was chosen for installation.

Mr. Brown says, "Our experience with SPANG CW Steel Pipe has been very favorable, and we do not hesitate to recommend it. It worked out very well in this new building, and we have no doubts it will give top service."

You'll hear this type of comment about SPANG CW wherever you go. Men who have worked with SPANG know from experience that it is a *top-quality* product, uniform in every respect, easy to install and will give years of trouble-free service in every type installation.

Why don't you cash in on SPANG'S careful *quality-controlled* manufacturing? Make your next pipe order SPANG CW Steel Pipe. Let your nearby SPANG Distributor serve you!

Gerritt Van Leersum, building maintenance superintendent, explains the heating and air conditioning system to Robert E. Gullette, Vice President and General Manager of First Security Building Company. Top-quality SPANG Pipe serves the installation in this 12-story building.

SPANG CW® STEEL PIPE

SPANG-CHALFANT
DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Two Gateway Center, Pittsburgh, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

The Booming South and Southwest . . .

New Plants — Expansions

√ Manufacturing Plants
√ Utility Plants
√ Large Service Plants

Highlights for July, 1956

South Atlantic

$25,000,000 expansion project underway at **Jacksonville, Fla.** for **National Container Corp.** . . . July, 1958 is production date expected for **Hudson Pulp & Paper Corp.'s** $25,000,000 newsprint plant at **Palatka, Fla.** . . . 185 x 140 ft fish freezer plant to have a storage capacity of 5,000,000 lb underway at **St. Petersburg, Fla.** — cost, $200,000 . . . **General Electric Co.** effecting plans for multi-million dollar electronics plant at **St. Petersburg, Fla.**

Multi-million dollar glass plant underway for **Owens-Illinois Glass Co.** on an 85 acre site in **Atlanta, Ga.** . . . The first stage ($3,000,000) of a $20,000,000 brewery for **Carling Brewing Co., Inc.** underway in **Atlanta, Ga.** on a 140 acre tract . . . Nuclear-powered aircraft facilities planned for **Dawsonville, Ga.** by USAF and **Lockheed Aircraft Corp.** . . . $1,500,000 allotted for initial construction of the concrete dam at the **Savannah River-Hartwell, Ga.** project . . . **Southern Nitrogen Co.** completing $14,000,000 nitrogen plant at **Savannah, Ga.** . . .

Plans underway for the first phase of **Charlotte, N. C.'s** $6,000,000 water expansion project which will take 2 years to complete . . . Summer construction expected for **Westinghouse Electric Co.'s** $500,000 manufacturing repair plant at **Charlotte, N. C.** . . . **Stein, Hall & Co., Inc.** effecting plans for $250,000 textile and adhesive products manufacturing plant at **Charlotte, N. C.** . . . $500,000, 29,600 sq ft wood coreboard plant to be completed in **High Point, N. C.** by Sept. for **New England Industries, Inc.** . . . Underway on a 200 acre site at **Ita, N. C.** is the $500,000 brick plant for **Nash Brick Co.** . . . **Carolina Paper Box Co., Inc.** is constructing a $100,000 branch plant at **Wilson, N. C.**

E. L. Lavino & Co. plans a $4,000,000 expansion of its ferromanganese plant in **Lynchburg, Va.** which will double its production . . . $500,000 packing plant and slaughterhouse is planned for a 7 acre tract in **Norfolk, Va.** for **Perlin Packing Co., Inc.**

These highlights briefed from SPI'S SOUTHERN INDUSTRIAL NEWS SERVICE, a monthly publication issued exclusively to SPI advertisers and their representatives through the South and Southwest.

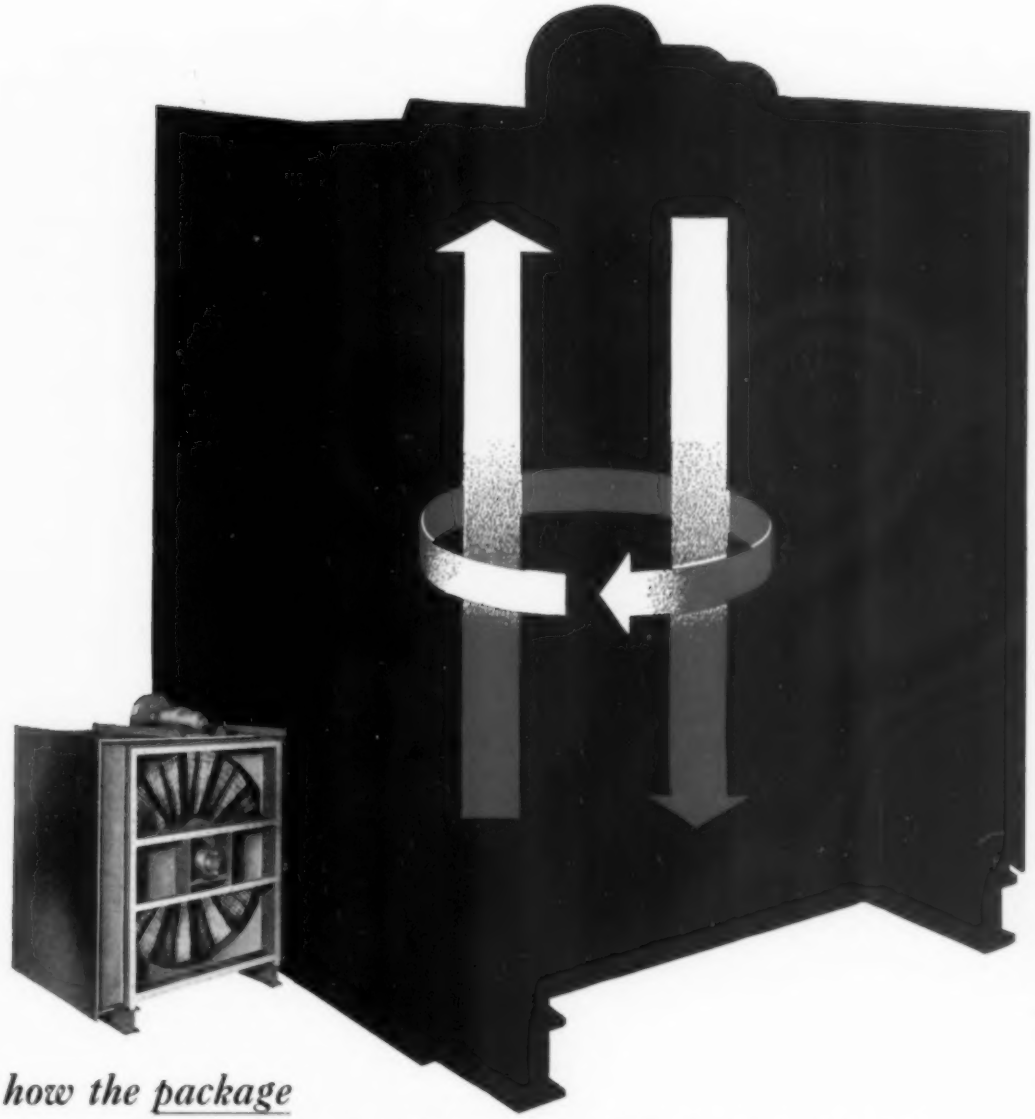
East South Central

Anniston, Ala. is the site of a $350,000 expansion project of **M & H Valve and Fittings Co.** . . . $500,000 bulk feed handling plant will be erected for **Western Grain Co.** . . . Summer construction is anticipated for **Southern Can Corp.'s** 100 x 280 ft, $750,000 can manufacturing plant in **Birmingham, Ala.** . . . **Florence, Ala.** is the home of **Stylon Corp.'s** third plant which will add more than 8,000,000 sq ft of tile, giving an increase in production of 66 2/3% . . . $1,000,000 textile research and development laboratory and pilot plant are planned for **Courtaulds Inc.** at **Lemoyne, Ala.** . . . **Alabama Power Co.** planning a $25,000,000 expansion for its Barry Steam plant at **Mobile, Ala.** . . . Fall, 1959 completion is scheduled for **Marathon Corp.'s** paper mill at **Naheola, Ala.** which will produce 300 tons of bleached sulfate pulp daily . . . $475,000 printing plant planned for **International Color Printing Co.** on a $65,000 site in **Sylacauga, Ala.**

$2,000,000-$3,000,000 expansion program underway for **American Synthetic Rubber Corp.** at **Rubbertown, Ky.** — completion, early in 1957.

Ackerman Manufacturing Co., an affiliate of Irwin Mfg. Co., underway in **Ackerman, Miss.** — $200,000 work shirt and sportswear factory . . . $100,000 warehouse addition for **Booneville Compress Co.** planned for **Booneville, Miss.** . . . 208 x 272 ft warehouse addition, costing

(Continued on Page 12)



how the package

LJUNGSTROM® AIR PREHEATER

boosts small boiler performance . . .

Advantages of
The Package Ljungstrom Air Preheater

1. Reduces fuel consumption . . . even permits use of low grade fuels.
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3. Eliminates cold spots . . . keeps corrosion to a minimum.
4. Easy, fast to clean and maintain.
5. Comes fully assembled—ready to install.

The new, completely *shop-assembled* Package Ljungstrom Air Preheater means that boilers as small as 25,000 pounds of steam per hour can have the advantages of regenerative preheating using the same principle of heat recovery used by large, efficiency-minded utilities.

Here's what the Package Ljungstrom does for you: (1) It saves fuel—roughly 1% for every 45-50 F air preheat. (2) It boosts boiler output and efficiency substantially. (3) Ljungstrom permits use of lower grade fuels. All of which means better performance at lower cost. For more detailed information — get in touch with The Air Preheater Corporation, today. Free brochure on request.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

New Plants — Expansions (Continued)

$100,000, planned for **Sunflower Compress Co.** in **Indianola, Miss.** . . . $13,000,000 hydraulic equipment manufacturing plant underway in **Jackson, Miss.** for **Vickers, Inc.** . . . 54,300 sq ft hardboard plant, part of the $26,000,000 expansion program of **Johns-Manville Corp.**, having an annual capacity of 60,000,000 sq ft of hardboard, planned in **Natchez, Miss.** with completion expected in mid-1957 . . . Multi-million dollar expansion program for Tupelo Div. of **Rockwell Mfg. Co.** in **Tupelo, Miss.** expected to be completed in the fall.

Sept. operation anticipated for the $1,500,000 **Clinchfield Coal** processing plant at **Carbo, Tenn.** . . . 90,000 sq ft addition planned as part of the $1,250,000 expansion program of **Shelby Paper Box Co.** in **Memphis, Tenn.** . . . $2,000,000 soybean processing plant for **Cargill, Inc.** being erected on an 11 acre tract at **Presidents Island, Tenn.** . . . $4,000,000-$6,000,000 wind tunnel planned at **Tullahoma, Tenn.** for **Diffusser & Scavenger Scoop.**

West South Central

$325,000 improvements to be made at **Mena, Ark.** in the form of new sewage plant and water and sewer extensions . . . **Ed White Junior Shoe Co.** constructing in **Paragould, Ark.** a $200,000 plant addition . . . Fall operations scheduled for the $300,000 laundry motors plant for **Emerson Electric Co.** at **Paragould, Ark.** . . . $57,000,000 newsprint and bleached kraft board mill underway at **Pine Bluff, Ark.** for **International Paper Co.** . . . 3 acre plot at **Star City, Ark.** is the site of the 33,000 sq ft shirt factory of **Byrds Mfg. Co.** . . . $500,000 construction of water and sewer lines planned for **West Memphis, Ark.**

$20,000,000 installation planned for a 2,800 acre tract in **Baton Rouge, La.** for **Dow Chemical Co.** . . . **Wyandotte Chemicals Corp.** planning $30,000,000 plant in **Baton Rouge, La.** for the manufacture of Chlorine-caustic soda, ethylene oxide and ethylene gycol . . . **Kaiser Aluminum & Chemical Corp.** will construct two potroom buildings, each more than 1100 ft long, in **Chalmette, La.** which will increase annual capacity by 55,000,000 lb . . . $500,000 alumina plant planned for **Kaiser Aluminum Corp.** in **Gramercy, La.** . . . $6,250,000 coking unit, operated by **Continental Oil Co.** and owned by **Lake Charles Chemical Co.**, underway at **Lake Charles, La.** . . . $40,000,000 expansion planned for **Olin Mathieson Chemical Corp.** in **Monroe, La.** . . . **Gulf States Utilities Co.** planning a $34,000,000 electric power station in **Scott, La.** . . . Sept. completion anticipated for **Olin-Mathieson Chemical Corp.'s** $1,000,000 flooring plant at **Shreveport, La.**

Mid-1957 completion expected for **Continental Oil Co.'s Ponca City, Okla.** refinery, costing $3,000,000 . . . $200,000 warehouse for distribution facilities planned in **Tulsa, Okla.** for **Westinghouse Electric Supply Co.** . . . 26,250 sq ft building underway in **Tulsa, Okla.** for **Leo Maxwell Co.**, costing $165,000 . . . **General Electric Supply Co.** planning in **Tulsa, Okla.** a 35,000 sq ft building costing $200,000.

Multi-million dollar expansion project underway for **Phillips Petroleum Co.'s** Sweeny refinery in **Bay City, Tex.** . . . **Celanese Corp. of America** planning a multi-million dollar plant for a 220 acre tract in **Houston, Tex.** for the manufacture of fortiflex . . . $500,000 expansion planned for **Wyatt Metal & Boiler Works' Dallas** and **Houston, Tex.** plants . . . 28,000 sq ft plant costing $200,000 underway in **Houston, Tex.** for **Industrial Towel & Uniform Co.** . . . Nov. completion of $3,000,000 chemical plant addition to **Cosden Petroleum Corp.'s Midland, Tex.** refinery anticipated . . . **Central Power & Light Co.** constructing on 270 acres in **Mission, Tex.** a $7,000,000 electrical power plant . . . $45,000,000 alumina plant underway for **Aluminum Co. of America** in **Point Comfort, Tex.** . . . **Port Arthur, Tex.** is watching the multi-million dollar expansion of **Gulf Oil Corp.** . . . $15,000,000 ethylene plant planned in **Port Arthur, Tex.** for **Gulf Oil Corp.** . . . **General Electric Co.** constructing $15,000,000 plant in **Tyler, Tex.** to manufacture home cooling equipment.

Kansas and Missouri

$5,000,000 expansion program planned for **Sealright Co.'s** Fairfax plant in **Kansas City, Kan.** with completion scheduled by end of the year.

$250,000 building underway at **Aurora, Mo.** for **Juvenile Shoe Corp.** . . . **D-X Sunray Oil Co.** planning $2,000,000 expansion program in **Kansas** and **Missouri** for service stations and bulk plants . . . **Vaisey-Bristol Shoe Co.** constructing a 42,000 sq ft shoe factory in **Monett, Mo.** to cost $200,000 . . . $250,000 storage building under way for **Lily Tulip** plant in **Springfield, Mo.**

Georgia and Alabama Power to Build Huge Steam Plant

Plans for the construction of a steam-electric generating plant, to be owned jointly by the **Georgia Power Company** and the **Alabama Power Company**, have been announced.

The new plant, with an expected ultimate capacity of 1,000,000 kw, will be constructed on the Coosa River, near the coal fields of Alabama, in order to take advantage of low-cost fuel available in that area.

The Coosa River location will put the plant within easy reach of many large load centers and, as a result of improvements in the art of transmitting power, it is now cheaper to ship electricity over transmission lines than to transport coal from distant mines.

The first power installation will consist of two 250,000 kw steam-electric generating units, representing an initial investment of about $75 million. These units are scheduled for completion in 1961. Two additional units of like size are expected to be installed by the end of 1963, giving the new plant its ultimate capacity of one million kilowatts. Total cost of the plant is estimated at about $150 million.

The plant will be built and operated by a new company known as **Southern Electric Generating Company**, which will be financed by The Southern Company investing approximately $25 million by 1961 in the common stocks of the Georgia and Alabama Power Companies which, in turn, will invest these funds in the common stock of the generating company. Additional construction funds will be obtained by the generating company through the issuance and sale of debt securities. The Georgia and Alabama companies will share equally in the power output of the new plant.

Smithfield Packing Co.

Proves the Dependability of QC Boilers!

Smithfield Packing Co., Smithfield, Va.

QC Boiler maintains peak efficiency for over 10,000 hours continuous operation . . . no shut down time!

The Smithfield Packing Co., nationally famous packer of Luter's quality meat products, pays tribute to the dependability of QC Boilers!

The installation, consisting of one 13,800 lbs/steam/hr Queen City "bent-tube" water tube boiler, has proved a time and money-saver for Smithfield.

This QC Boiler operated continuously 24 hours per day for 12 months producing 5,000 lbs. more steam per hour than the rated capacity! After amassing over 10,000 hours continuous operation, the boiler was shut down for maintenance inspection and was put back on the line immediately!

For all-round boiler efficiency, install a QC water tube boiler in your plant. No matter what the fuel . . . oil, gas, coal, combination gas-oil . . . Queen City Boilers give you more steam, faster and drier, for less cost! Available from 300 to 17,500 lbs/steam/hr, up to 250 psi.

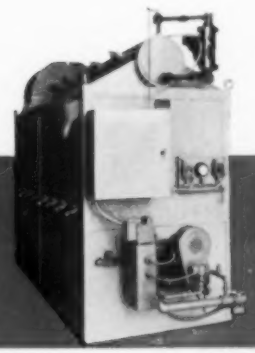


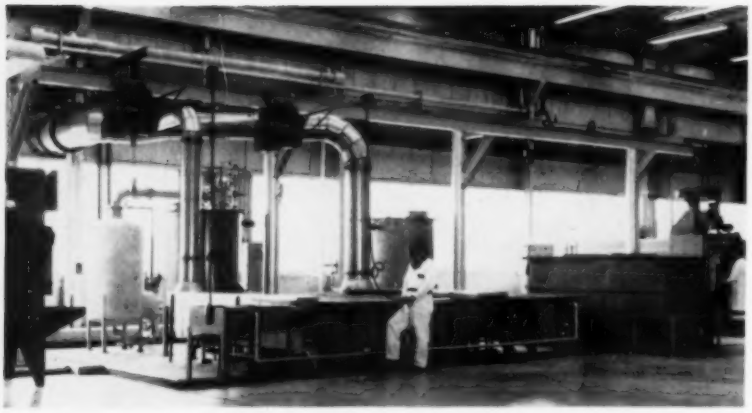
Illustration shows packaged 50 h.p. oil-fired boiler for heavy oil. Ready for immediate shipment from stock.

For complete information, write

Queen City Engineering Co.

P. O. Box 3103 CHARLOTTE • NORTH CAROLINA

NEWS *for the South and Southwest*



Fuel elements are pickled, rinsed, given a final running-water bath and dried in this recovery area of the plant's fuel element fabrication building. Equipment shown includes (front, from left) a drying oven, pickling and rinsing tanks, a degreasing unit, and a vapor blaster. Floor of entire recovery area is lined with acid-resistant brick, and slopes to a sump. Wastes may be directed from sump for processing in filter press (not shown) or evaporator (left center, rear), if salvage operations are indicated by analysis.

B & W's Nuclear Facilities Plant at Lynchburg, Virginia, in Production

The Babcock & Wilcox Company's Nuclear Facilities Plant at **Lynchburg, Virginia,** is the first major plant in the country erected entirely at private expense to manufacture and test nuclear fuel elements and related products for peacetime use. Metal casting, rolling, welding and machining equipment in the 32,000 sq ft fabrication building is now turning out flat-plate type fuel elements.

B & W also has contracted to design, fabricate, erect and test the nation's first privately owned nuclear steam generator for the Consolidated Edison Company. Production of fuel elements for this reactor will begin as soon as final design details have been completed. When designing the Lynchburg plant, provisions were made to add facilities necessary to make pin, rod, and cylindrical-type fuel elements, as well as the flat-plate types now in process.

How They Are Made — Zirconium and enriched uranium metal are alloyed in a melting furnace. The 100 lb ingots (worth $40,000 each) are formed and remelted to improve homogeneity.

Ingot is reconditioned on a lathe to remove imperfect material and is then sheathed in steel; preheated to 1450 F for hot forging to a billet for rolling. The billet is reheated and hot rolled to approximate fuel element core thickness.

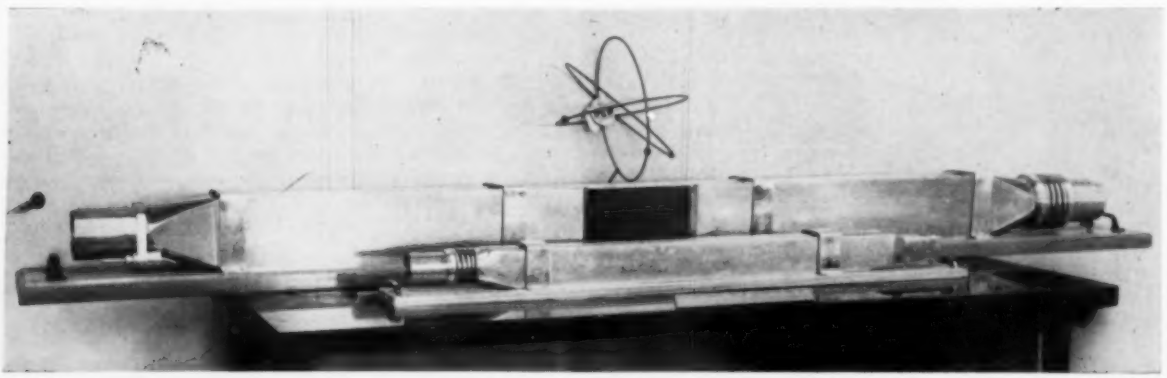
Steel sheath is removed and plate cleaned by vapor blasting and acid pickling; then cold rolled to punching thickness. Core size pieces are punched from plate and assembled in "picture frame" with zirconium alloy cladding. Assemblies are sheathed in steel once more, heated to 1450 F and hot rolled to approximate finished fuel-plate thickness.

Protective sheath is then removed, element cleaned by vapor blasting and acid pickling, and cold rolled to final thickness. Each plate is fluoroscoped to locate "meat" and then machined to final width and length.

Thorium for fertile plates is re-

(*Continued on Page* 25)

Manufacturing operations in The Babcock & Wilcox Nuclear Facilities Plant will be devoted to the fabrication of nuclear fuel elements, two types of which are shown here. Large unit at rear is a prototype model of element to be used in nuclear steam generator B&W has contracted to create for the Consolidated Edison Company. In foreground is model of fuel element now being processed in plant for the Materials Testing Reactor under operation by the Phillips Petroleum Company for the U. S. Atomic Energy Commisison at Arco, Idaho. One-foot rule in front indicates size of fuel elements.



Kellogg's Design Calculation Techniques Keep Pace

Latest and most valuable electronic addition to The M. W. Kellogg Company's facilities for solving the design calculation problems of power piping customers is a new, large magnetic drum digital computer. It can execute 500 arithmetical operations per second; conservatively can solve 40 simultaneous equations in 30 minutes; and has a memory capacity of over 4000 ten-digit words. This computer is now in use at Kellogg's new New York Headquarters, and supplements a smaller computer which has been employed for some time at M. W. Kellogg's Jersey City laboratories.

This new computer enables The M. W. Kellogg Company's engineering staff to undertake a far greater number of precise calculations in less time than ever before and, as a result, to determine the optimum main and reheat steam piping designs for steam-electric power plants in minimum time.

A cordial invitation to see the new Datatron computer at work is extended to consulting engineers, and to engineers of power generating companies and their equipment manufacturers. Appointments may be made by contacting the office of the Sales Manager, Fabricated Products Division, The M. W. Kellogg Company, 711 Third Avenue, New York 17, N. Y.

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STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

15 **STOKERS**—Bulletin covers complete line of underfeed coal stokers and units for profitable disposal of wood waste; illustrated case studies; meet any city's smoke ordinance.—MC-BURNEY STOKER & EQUIPMENT COMPANY.

16 **SMALL BOILER PERFORMANCE** — Brochure shows how the packaged Ljungstrom air preheater boosts performance. Boilers are small as 25,000 lb/hr can have advantages of regenerative preheating—saves fuel, boosts output, and permits use of lower grade fuels. — THE AIR PREHEATER CORPORATION.

25 **PACKAGED BOILERS** — New bulletin PSG-2 shows construction details and table of capacities, dimensions and weights for nine sizes of units. — HENRY VOGT MACHINE CO.

39 **PCKG. AUTOMATIC BOILER**—Bulletin 1220 highlights features of Powermaster packaged automatic boilers; sizes to 500 hp; pressures to 250 psi. Factory-assembled units; compact; fuel flexibility. — ORR & SEMBOWER, INC.

51 **STEAM GENERATORS** — Catalog 811 describes 18 sizes from 20 to 600 bhp for fully automatic operation burning oil, or gas, or both; pressures to 250 psi; 80% thermal efficiency guaranteed. — SUPERIOR COMBUSTION INDUSTRIES INC.

76 **GAS BURNER** — Bulletin — Describes the Rectilinear gas burner, an application of the venturi principle which provides high input through narrow rectangular openings for firing — in a horizontal plane through fire doors or small openings over handfired coal grates or stokers—or for firing in a vertical plane on either side of stoker or oil burner.—THE WEBSTER ENGINEERING COMPANY.

87 **STEAM TURBINES** — Single Stage — Bulletin 500 describes features and characteristics of company's type DH steam turbines in horizontal and vertical models. — DEAN HILL PUMP COMPANY, INC.

89 **SOLID-WHEEL TURBINE** — Bulletin S-116 gives complete details on Terry solid-wheel turbo-geared units; blades cannot foul; no need for close axial blade clearance. — TERRY STEAM TURBINE COMPANY.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

112 **"PACKAGED" FANS** — Catalog 515 shows how Clarage V-belt Ready Units economically answer your smaller air handling requirements. 18 sizes, wheel diameters 9¾ to 32½", capacities to 12,000 cfm. Direct connected units also available. — CLARAGE FAN CO.

126 **CENTRIFUGAL PUMPS**—Bulletin 7248A covers new DMV-DHV single-stage line for general hydraulic service; double mechanical shaft seals eliminate stuffing box maintenance; sizes from 3 to 6 in. with heads to 350 ft and capacities from 250 to 2400 gpm.—INGERSOLL-RAND COMPANY.

135 **HEAT EXCHANGER** — Bulletin 132 shows how sectional Aero unit gives close temperature control, saves labor, power, and water; design improves heat transfer to out-door air by evaporation; 7,000,000 to 18,000,000 Btu/hr capacity range. — NIAGARA BLOWER COMPANY.

138 **STEAM PUMP MAINTENANCE** — Bulletin G-2280 P, 23 pages, "How to Install and Take Care of Steam Pumps" gives 28 tips on proper installation and 54 tips on field-proven care techniques. — WORTHINGTON CORPORATION.

152 **STAINLESS STEEL PUMP** — Bulletin 725.4 describes pump for economical handling of hot, corrosive or abrasive liquids; 9 sizes with capacities up to 720 gpm; heads to 200 ft.—GOULDS PUMPS INC.

158 **SUBMERSIBLE PUMPS** — 12p bulletin covers four basic pump types; handy selection chart, units range from 5 to 900 hp and from 30 gpm capacity to 30,000 gpm and above.—BYRON JACKSON, DIV. OF BORG-WARNER CORPORATION.

167 **ROTARY PUMPS**—Bulletin 307—Describes the features and advantages, and outlines the engineering details of Blackmer rotary pumps. These have been manufactured since 1904 and incorporate the outstanding advantages of "automatic adjustment for wear," and economical replacement of parts. — BLACKMER PUMP CO.

172 **PUMPS** — Catalog A-156 covers double-suction, general purpose, single-stage centrifugal pumps for general service wherever liquids of low viscosity are to be moved; low maintenance; sizes up to 10 in. discharge.—C. H. WHEELER MANUFACTURING CO.

190 **CENTRIFUGAL PUMPS**—Bulletin 1—Gives a condensed listing of all types of centrifugal pumps for every service, including capacity, pressure and head range for each type. A quick reference on centrifugal pumps from A to Z.—PACIFIC PUMPS, INC.

INSTRUMENTS—METERS CONTROLS—REGULATORS

204 **FLOATLESS LEVEL CONTROL** —Data sheets PC-27 describe control that is unaffected by surface agitation and equipment vibration. Simple, compact, one adjustment unit.—LESLIE CO.

207 AUTOMATIC OSCILLOGRAPH —Bulletin describes features of the new RS-9 units which give more channels, faster starting, more types of starting relays, sharper traces, and lower expansion cost.—HATHAWAY INSTRUMENT COMPANY.

211 FLUID CONTROL VALVE — Bulletin CV-1 describes "Bellofram" construction where no force is lost at end of the stroke where spring compression requires maximum force. Sizes start at ⅛". — FOSTER ENGINEERING COMPANY.

222 PRESSURE REGULATORS — Catalog 76—Gives complete detailed information covering applications, operation and specifications of Reducing Valves, Pump Pressure Regulators and Back-Pressure Regulators. Included is a simple, practical method for selecting size of regulators.—MASON-NEILAN DIVISION OF WORTHINGTON CORPORATION.

224 PRECISION RELAYS — Bulletin MRM 240 describes new high limit and low limit action relays for alarm signalling and on-off operation of electrical loads.—MANNING, MAXWELL & MOORE, INC.

253 COMBUSTION EFFICIENCY — Specs E65-1 & E12-5 describe oxygen - combustibles analyzer - recorder which provides continuous 2 in 1 check of combustion efficiency by recording both oxygen and combustibles in flue gas.—BAILEY METER COMPANY.

PLANT EQUIPMENT—WELDING TOOLS—PROCESS SPECIALTIES

306 STEEL BUILDINGS — Catalogs cover Series S buildings (clear span widths from 4-40 ft) featuring Steelox panel construction; and Series P buildings (clear-span widths up to 100 ft); fire resistant & weather tight; simplified design eliminates much job-site labor.—ARMCO DRAINAGE & METAL PRODUCTS, INC.

335 BREECHINGS, STEEL OR IRON — Catalog 200-B — Describes breechings of steel or iron for use in industrial, power and utility plants—standard or tailored to the job.—J. J. FINNIGAN CO., INC.

336 RETAINING WALLS — Catalog RW 3555 shows how bin-type walls stabilize slopes and gain valuable ground for buildings, parking areas; all-metal cellular construction; all-bolted assembly means small crews can do the job.—ARMCO DRAINAGE & METAL PRODUCTS, INC.

351 STEEL GRATING AND TREADS —Bulletin 2096 describes Blaw-Knox electroforged steel grating and treads, their advantages and typical successful applications. — BLAW - KNOX EQUIPMENT DIVISION, BLAW-KNOX COMPANY.

370 WELDING ROD GUIDE — 32 page DirectoRod Guide helps you select from 160 rods those that will give you the largest savings per job, whether production, maintenance or salvage. — EUTECTIC WELDING ALLOYS CORP.

375 WELDING SERVICE—Sheet TIS 2600 describes new welding advisory service. Survey highlights operations where metal joining, machinery repair and overlaying for wear resistance can be increased profitably.—EUTECTIC WELDING ALLOYS CORPORATION.

384 FLOOR GRATING—Catalog No. AT254 — Describes company's free planning and checking service for completely custom fabricated floor grating installations.—BORDEN METAL PRODUCTS CO.

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253	306	335	336	351	370	375	384	405	415	420
422	425	430	451	500	511	536	596	597	603	624
649	686	694	705	711	712	728	735	745	757	801
805	811	852	861	864	909	936	998	S-1	S-2	S-3
S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13	S-14
S-15	S-16	S-17	S-18	S-19						

Also send further information on following New Equipment (page 66).

G-1 G-2 G-3 G-4 G-5 G-6 G-7 G-8 G-9 G-10 G-11

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PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

405 AIR LINE FILTERS — Bulletin 200 shows how simply installed and maintained Staynew pipe line filters keep air-operated equipment free from pipe scale, dust, dirt, and condensates. Filter compressed air under all pressures and temperatures. — DOLLINGER CORPORATION.

415 WELDING PIPE FITTINGS — New catalog illustrates where to use Weldolet and Thredolet branch pipe fittings. Specific areas of application shown with correct installation procedure. Describes complete range of stainless, alloy and non-ferrous fittings and Bonney's new marking standard. — BONNEY FORGE & TOOL WORKS.

420 VALVE CONTROLLERS — 30p catalog L-650 describes Limitorque motor-operated valve controllers which may be actuated either remotely or manually to open and close all types of valves. Readily adapted to microwave control. — PHILADELPHIA GEAR WORKS, INC.

422 MOTOR PUMP — Liquid handling applications described in general bulletin. Sizes from ¼ to 75 hp, 5 to 2500 gpm with heads to 650 ft. — INGERSOLL-RAND.

425 THERMODYNAMIC STEAM TRAP — Bulletin 255-44 — Describes simple low maintenance steam trap which features no valve-closing mechanisms to wear or stick, no critical clearances to choke, and no gaskets to leak. Only moving part is a solid stainless steel disc. Same trap for all loads and pressures 10-600 psi. Operates against back pressures up to 50% of inlet pressure. — SARCO COMPANY, INC.

430 CHECK VALVE — Catalog 30A highlights the "tilting disc" check valve for handling fluids or gases under wide range of pressures. — THE CHAPMAN VALVE MFG. CO.

451 AIR RELIEF TRAPS — Bulletin No. 2062 — Describes application of ball float traps for venting air from hot water heating systems, water service lines, etc. Hook-up drawings, prices included. — ARMSTRONG MACHINE WORKS.

MAINTENANCE PACKING GASKETS, LUBRICATION

500 LININGS & COATINGS — Brochure 7008, 4 p, describes company's rubber, neoprene and polyvinyl chloride lining and coating service for pipes, valves, tanks, ducts, vessels, etc. Provide protection against corrosion and abrasion in handling acids, bases, salts and fumes; coatings conductive or non-conductive, soft or hard, suitable for high or low temperature operations. — RADIATOR SPECIALTY CO.

511 MAINTENANCE IDEAS—"Genius at Work" — Contains ideas about plant maintenance, bits of philosophy, new products and a description of the company's line. — KANO LABORATORIES.

536 ROD AND SHAFT PACKINGS — Bulletin A-131, 8 pages — Describes Garlock patented "lattice braid" rod and shaft packings; discusses construction features, materials available, sizes, forms and service reports from users in various industries. — THE GARLOCK PACKING CO.

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253	306	335	336	351	370	375	384	405	415	420
422	425	430	451	500	511	536	596	597	603	624
649	686	694	705	711	712	728	735	745	757	801
805	811	852	861	864	909	936	998	S-1	S-2	S-3
S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13	S-14
S-15	S-16	S-17	S-18	S-19						

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596 **TUBE CLEANERS & EXPANDERS** — Catalog 77 covers tubes in high pressure boilers, superheaters, economizers and other heat exchange equipment. Model 38 expander rolls and flares in single operation. — THOMAS C. WILSON, INC.

597 **FACING MATERIAL** provides superior sealing surface for mechanical seals — Data sheet describes the Dura Seal No. 55 Facing Material recommended for use in sealing all chemicals with exception of hot strong caustics and some fluorine compounds. — DURAMETALLIC CORPORATION.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

603 **MONORAIL CASE STUDIES** — File F-1 — Offers 20 new studies of engineered monorail applications in various industries. Factual information, complete with photos and plain drawings. — AMERICAN MONORAIL CO.

624 **FREIGHT ELEVATORS**—Booklet A-414 describes the new Plunger Electric Freight Elevator designed for low-rise, light and heavy duty freight handling requirements. — OTIS ELEVATOR COMPANY.

649 **HYDRAULIC AERIAL LADDERS** — Catalog outlines features of Series 2100 all-hydraulic ladder, which rotates 360 degrees, reaches up to 40 ft in the air and elevates to 75 degrees. — J. H. HOLAN CORPORATION.

686 **VARIABLE SPEED TRANSMISSIONS** — 8 p illustrated bulletin describes Speed-Trol line with positive pulley adjustment. Gives data on factors in drive selection and varied automatic and remote speed control accessories. — STERLING ELECTRIC MOTORS.

694 **STOCK ROLLER CHAINS AND SPROCKETS** — Catalog No. 754, 66 pages — Describes and illustrates Stock roller chains and sprockets including minimum and finished bore, ready-to-use Taper-Lock bushed sprockets, as well as chain selection and application data.— DIAMOND CHAIN COMPANY, INC.

WATER TREATMENT, HEATING, VENTILATING, AIR CONDITIONING, REFRIGERATION, DUST & FUME CONTROL

705 **TEST YOUR TOWER** — Bulletin offers simple, proven method by which you can determine how closely your actual tower performance measures up to specified performance. Particularly applicable to operations geared to temperature of process cooling water. Know your tower's capabilities and limitations. — THE MARLEY COMPANY.

711 **REFRIGERATION CONDENSERS** — Bulletin RC-2 shows how Vogt condensers step up rate of heat transfer and step down head pressures. Closed type for clean waters; film type where water is hard and forms scale. Units save power and refrigeration cost. — HENRY VOGT MACHINE COMPANY.

712 **ION EXCHANGE EQUIPMENT** — Bulletin A-255 describes the various methods of ion exchange treatment which provide suitable boiler feedwater, process water, and purified solutions. — ILLINOIS WATER TREATMENT CO.

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728 **DEMINERALIZATION** — Bulletin 5800, 40 pages — Explains the treatment of water by demineralizing, principles of ion exchange, applications of many anion and cation exchange materials. A series of curves gives estimates of cost, design and operation. — COCHRANE CORP.

735 **REFRIGERATING MACHINE**— Bulletin 1426 describes the Tonrac single-stage hermetic centrifugal refrigerating machine, which maintains constant chilled-water temperature regardless of load. Single level construction simplifies installation. — AMERICAN BLOWER CORPORATION.

745 **DUST & FUME CONTROL** — 40 p booklet gives helpful information on recovering dusts, fly ash, mists, fumes and other suspensions of gases. Summarizes important points design and plant engineers should know about electrical precipitators. — WESTERN PRECIPITATION CORPORATION.

757 **DEMINERALIZATION** — Reprint T-140, 24 p, discusses advantages and disadvantages of this process for today's power plants. Developments, trends, applications; case studies; flow sheets and performance curves. — GRAVER WATER CONDITIONING CO.

ELECTRICAL

801 **MOTORS** — Bulletin describes and catalogs more popular a-c motors from 1 to 600 hp, for every process and manufacturing requirement. Single phase and polyphase; surpass NEMA specifications. — BROOK MOTOR COMPANY.

805 **POWER FACTOR CORRECTION** — 28 page catalog shows how you can cut power costs by installing correction capacitors on motors and other inductive electrical equipment. Greater loads can be handled from existing circuits. Wiring, transformer and switchgear costs can be greatly minimized in new installations.—SPRAGUE ELECTRIC CO.

811 **ELECTRIC HEAT** — "100 Ways to Apply Electric Heat" gives a wealth of informative data on the use of electric heat in industry—fast, uniform, dependable, backed by nation-wide engineering service. — EDWIN L. WIEGAND CO.

852 **AUTOTRANSFORMER STARTER** with air break contacts up to 75 hp, 220 v; 150 hp, 440-550 v is described in Bulletin 646. Silver alloy contacts stay in good condition without filing, cleaning or dressing. — ALLEN-BRADLEY.

861 **ELECTRICAL PROTECTION SYSTEM** — Bulletin HCS — Describes "Fusetron" dual-element fuses which save recalibration and maintenance costs. Eliminates down-periods caused by needless blows and saves on installation costs. Available in all sizes from 1/10 to 600 amperes, both 250 and 600 volt types. Also in plug types for 125 volt circuits.— BUSSMANN MANUFACTURING COMPANY.

864 **ELECTRICAL SYSTEM PLANNING** — Book C-87 — "Power Up," 51 page book on electrical system planning, maintenance and modernization for industrial plants. Important sections on installation and maintenance of industrial electrical distribution systems; wire cable and conduit data; motor application data; and electrical systems reference data. — ANACONDA WIRE & CABLE CO.

OPERATING AIDS SUPPLIES & MISCL.

909 **INDUSTRIAL SKIN CLEANSER** — Folder describes Vi-Lan Clean, a non-alkaline, non-acid, all-purpose antiseptic skin cleanser that prevents dermatitis and other skin conditions. Self-service dispensing units. — DAMERON ENTERPRISES, INC.

936 **STOCK & WEIGHT HANDBOOK** — 84 pages — Gives complete information on all sizes and shapes of stainless and carbon steel products normally carried by steel warehouses. Useful charts and tables. — WAREHOUSE DIVISION, ATLANTIC STEEL COMPANY.

998 **FORGING AHEAD IN BUSINESS**—48 page book on problems of personal advancement. Shows how to improve your position and increase your income. Outlines executive qualifications in today's competitive market — ALEXANDER HAMILTON INSTITUTE.

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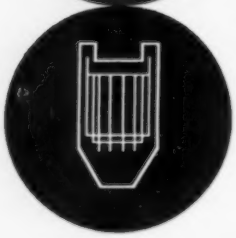
The only organization with 48 years of dust collection experience.

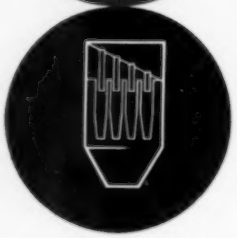
ELECTRICAL, MECHANICAL and CMP types of recovery systems.

COTTRELL Electrical PRECIPITATORS



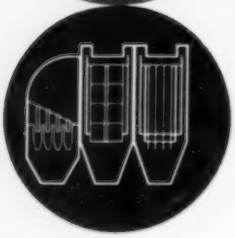
Western Precipitation pioneered commercial application of the now-famous Cottrell **Electrical** Precipitator—has more know-how, more experience, more basic advancements in this highly-technical electrostatic field of recovery than any other organization, domestic or foreign.

MULTICLONE Mechanical COLLECTORS



Western Precipitation pioneered the multiple small tube type of cyclonic collector—the type with higher centrifugal forces for greater recovery efficiencies. Multiclones are also easier to install, service and maintain—and require less space than other equipment of comparable capacity.

CMP Combination SYSTEMS



Western Precipitation pioneered the CMP (Combination Multiclone-Precipitator) type of recovery unit now favored by so many leading power plant operators—the unit that combines advantages of both the Mechanical and Electrical principles, and provides almost constant collection efficiency despite varying gas volume.

Plus **invaluable know-how**

The most important part of **every** Western Precipitation installation is this organization's unequalled experience gained through almost a half-century of continuous leadership in the highly-complex science of recovering suspensions from industrial gases. No other organization—anywhere—offers such seasoned judgment in Electrical, Mechanical and CMP recovery methods. Yet you pay nothing extra for this invaluable "know-how"!

Let us send you literature which describes Western Precipitation's unique services in greater detail. Write, wire or phone our office nearest you!

WP

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MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Reverse-Jet Filters
HOLO-FLITE Processors

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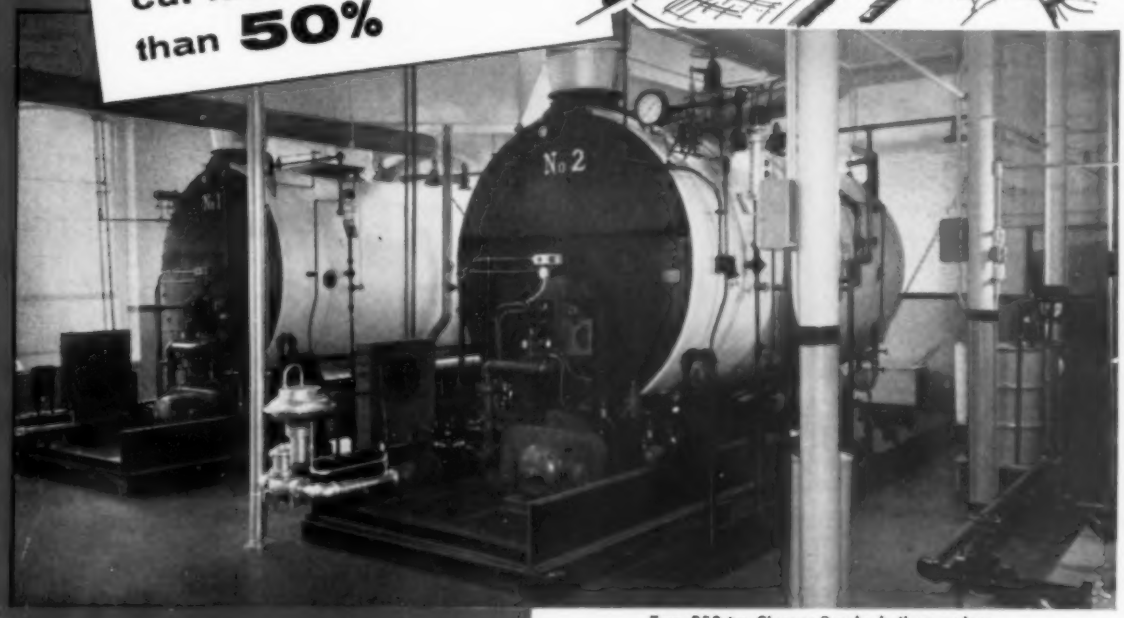
Newberry Mills survey showed plant engineers how to cut fuel costs more than 50%



Two 250-hp Cleaver-Brooks boilers replace four obsolete units. "Most attractive boiler room in the South," says Newberry Mills.

Two new Cleaver-Brooks boilers SAVE $23,445 the first year

G. B. Sessions, superintendent of Newberry Mills, says, "Eighteen months ago we installed two new Cleaver-Brooks boilers at Newberry Mills, Newberry, S.C., that are paying for themselves at a fast clip. At the present rate of savings, the boilers will be paid for in less than two years of operation. Fuel costs have been cut more than 50%."

When Newberry Mills engaged consulting engineers to analyze their heat and power load, they learned the startling facts of boiler obsolescence. They learned how they could cut operating costs with efficient boiler equipment. Their experience proves how the new boilers provided fuel and labor savings, a clean boiler room, free of soot, and reduced maintenance costs.

The savings on fuel for the first year of operation were an impressive $14,045.41. Maintenance savings amounted to $9,399.59. Periodic checks showed boilers performed at a fuel-to-steam efficiency of 82.88% on No. 6 oil.

Efficient Cleaver-Brooks four-pass construction with forced draft give you more for your fuel dollar. Four pass design maintains high gas velocity for effective scrubbing action. Forced draft design keeps fans running cool and trouble-free.

Send us your name to receive regular issues of new "Cleaver-Brooks Bulletin" — the boiler newspaper!

PERIODIC SURVEYS PAY. Find out how you can save with Cleaver-Brooks boilers. Get in touch with your local Cleaver-Brooks representative, or write: Cleaver-Brooks Company, Dept. H, 305 E. Keefe Ave., Milwaukee 12, Wis. Cable address: CLEBRO — Milwaukee — all codes.

Cleaver Brooks

TWENTY-FIVE YEARS OF LEADERSHIP
BY THE ORIGINATORS OF THE SELF-CONTAINED BOILER

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FREIGHT ELEVATORS for loads ranging from 40,000 pounds down to 1,500 pounds.

Booklet B-705 describes Otis Heavy Duty Freight Elevators.

Booklet B-720 describes Otis Self-Supporting Light Duty Freight Elevators.

Booklet A-414 describes Otis Plunger Electric Freight Elevators.

Booklet A-382 describes all Otis Vertical Transportation equipment and services.

ELECTRIC DUMBWAITERS for loads up to 500 pounds at speeds of 50 to 300 f.p.m.

Booklet A-411 describes Otis Traction Type Dumbwaiters for all-purpose use in multi-story buildings of any height; Otis Drum Type Dumbwaiters for 30'-6" maximum rise; and Otis Undercounter Dumbwaiters for stores and restaurants.

We'll be glad to send you any or all of the above booklets.

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"Working Model" of the Opposed-Piston Diesel

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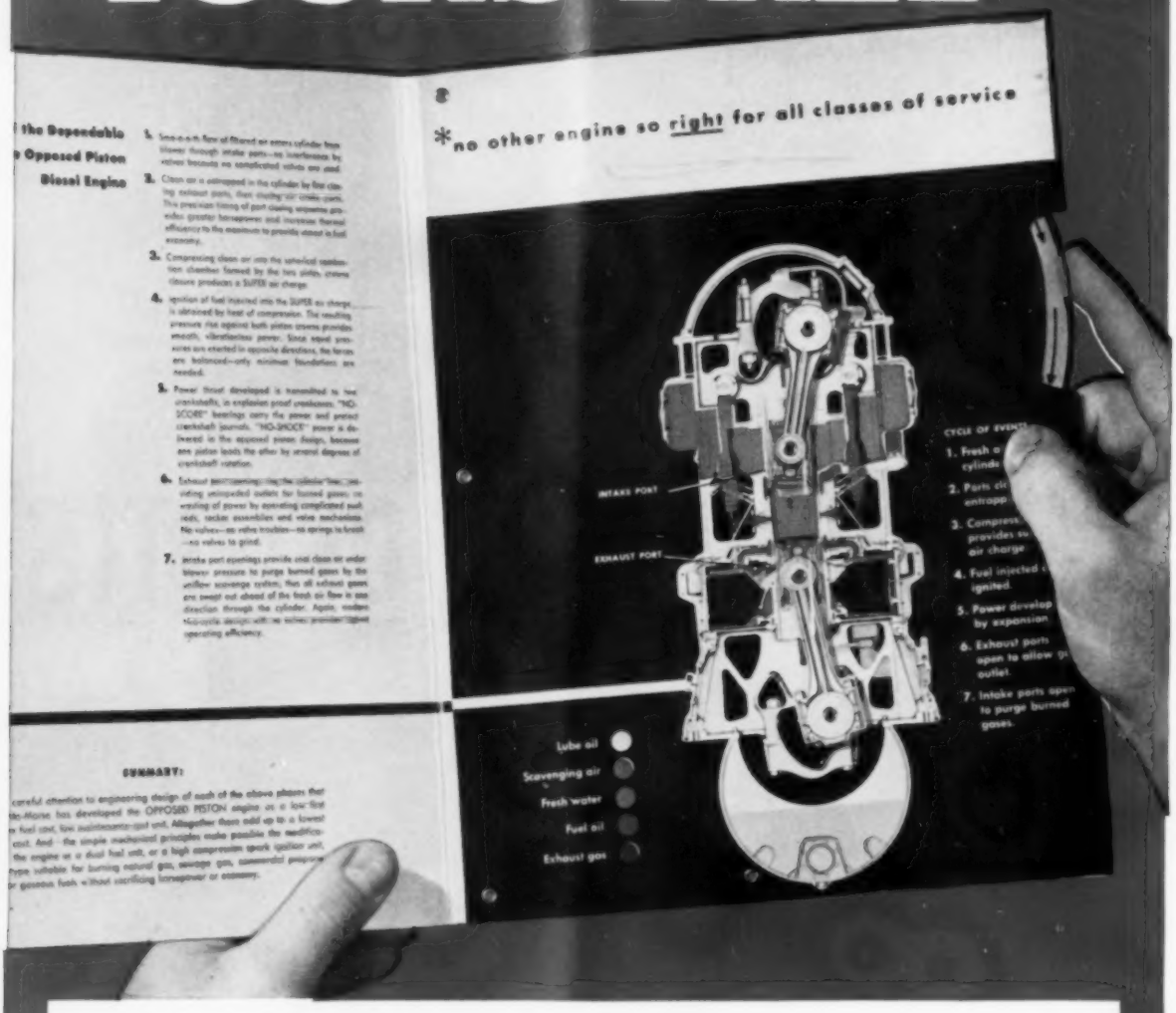

Here in Graphic Full Color

is a detailed working model of the Fairbanks-Morse Opposed-Piston Diesel Engine—and it's yours free for the asking.

With the 8-inch operating cutaway in front of you, you can follow the complete operating cycle of this outstandingly successful heavy-duty engine designed for continuous service. Moving the disc at the right operates the model showing exact position of pistons, and color codes condition in the cylinder, throughout the entire cycle of events.

You'll also see the simplicity of the O-P that has no valves, intricate valve trains, cylinder heads and gaskets—in fact, it has 40% fewer moving—wearing—parts than any comparable engine of equal horsepower.

If you are interested in dependable power with low operating and maintenance cost, send for your working model of the O-P diesel today! Simply attach this advertisement to your letterhead (or ask for O-P "Working Model") and send to Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois.

FAIRBANKS-MORSE
a name worth remembering when you want the BEST

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RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES
HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

News for the South & Southwest (Continued)

B&W Nuclear Plant—Continued from Page 14

ceived in ingot form. Ingots are preheated to 1400 F and hot forged to billets for rolling, then reheated to 1400 F and billets hot rolled to approximate "meat" thickness. After cleaning, strip is cold rolled, punched, and assembled with zirconium alloy cladding. Assemblies are then sheathed in steel, heated in a furnace to 1400 F and moderately hot rolled.

Assembly is then given diffusion anneal, reheated and hot rolled to approximate plate thickness. Steel sheath is removed, plate cleaned and cold rolled to final thickness, and again fluoroscoped.

Before assembly into "bundle" plates are acid cleaned and rinsed. In bundling, 30 thorium plates and 38 uranium-235 plates are positioned in jig and fusion-welded, which is followed by stress relieving. Assembly is then machined to final dimensions. End nozzles are attached by stainless steel rivets and assembly moved to lathe for final end nozzle machining. Acid cleaning, water rinse and drying operation precede final inspection.

Plant Safety — Although materials used in making fuel elements in the Lynchburg plant are not highly radioactive, special equipment and precautions are employed. There is an elaborate circulation and filtration system. Fabrication area, for example, undergoes a dozen complete air changes hourly, with seven circulation units drawing in over 100,000 cfm.

Exhaust ports at key points in the circulation system are equipped with microscopically-fine filters, which remove about 99.5% of airborne materials. Filter monitor devices sound alarms and shut down some operations automatically if significant amounts of radioactive gases appear.

Liquid wastes are carefully funneled to central points and monitored. A "tank farm" has been built to collect liquid wastes for neutralization and disposal.

Employees who handle nuclear materials wear protective clothing, and devices which indicate the extent of their exposure to radioactive substances. Special shower rooms are provided where employees bathe to remove any undetected radioactive particles before donning street clothes. Work clothes are cleaned in the plant's laundry.

On leaving fuel element fabrication area employees are checked with alpha scintillation counter and ratemeter unit for radioactivity. Lockers at right are for storage of work clothes which are kept separate from street clothes. Employees are required to bathe in shower room at left before dressing in adjoining room and leaving fuel element fabrication area.

Babcock & Wilcox Company's Lynchburg, Virginia, plant is continually checked by more than 25 different types of portable and fixed radiation detection instruments.

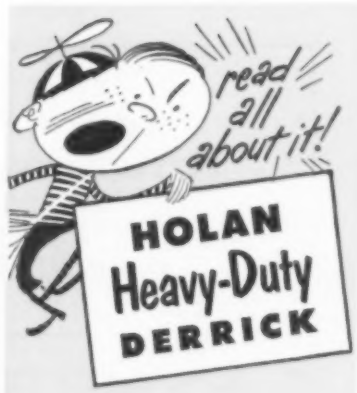
Plant operations are centered in two main areas of the 520 acre site. First, consisting of a manufacturing plant, gate house, steam plant and maintenance building, is the fuel element fabrication area. About 1,200 yards away is the critical experiment facility, and test site for nuclear components and systems.

Jones & Laughlin—Memphis.

Two appointments have been announced at the **Memphis, Tenn.,** Warehouse of the **Jones & Laughlin Steel Warehouse Division.**

Laurence J. Larkey, Memphis, Sales Manager of the Warehouse, has been appointed Manager of the Memphis Warehouse. **James J. Kelley,** Chicago, Manager of Procurement for J&L's Chicago Warehouse District, will succeed Mr. Larkey as Sales Manager of the Memphis Warehouse.

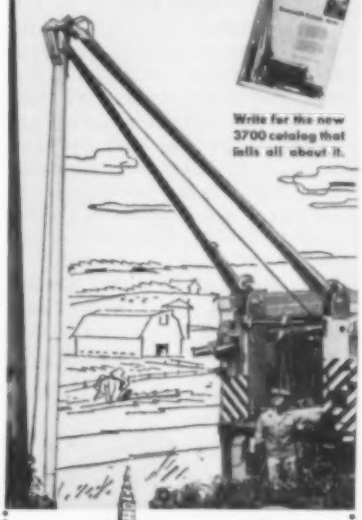
More News — Page 73



LIFTS LOADS TO 12,000 POUNDS

If you have big ideas for a derrick, the Holan 3700 has the muscles to carry them out. Front- or rear-mounted, the 3700 lifts loads to 12,000 pounds . . . sets and handles poles up to 75 feet long.

Write for the new 3700 catalog that tells all about it.



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4100 WEST 150TH STREET
CLEVELAND 11, OHIO

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Please send me the factual technical bulletin about Holan's 3700 Power Derrick.

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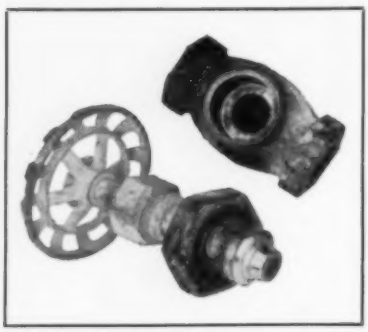
"I got 5 years of service from a valve I expected to last only 90 days"

Mr. C. L. Worthington, Chief Engineer for E. L. Bruce Co., Little Rock, Arkansas plant, standing near a Walworth No. 225P Bronze Globe Valve with "500 Brinell" stainless steel seats and discs that was installed in severe boiler blowdown service. Hardened seats and discs are especially resistant to wire drawing, steam cutting, or galling.

Some time ago Mr. C. L. Worthington, Chief Engineer for E. L. Bruce Co. plant at Little Rock, Arkansas, was having valve trouble on some newly installed boilers. The first boiler to go in service generated 600 hp operating at 200-pounds pressure. The water was so bad that a hot lime and soda ash water softener treatment had to be used, and it was necessary to add other chemicals to this solution from time to time. Mr. Worthington wanted to use a continuous blowdown to skim off the worst part of the scum on the water. He installed a small blow pipe about an inch below the normal water level in the boiler. This worked well, except that the one-inch valve on the line could only be partially opened and let a small part of the scum be blown off at one time. If the valve was widely opened, it would not take long to lower the water level in the boiler and run the steam pressure down. This service gave Mr. Worthington lots of valve trouble, as can well be imagined, because of the extreme wire drawing that occurred.



A Walworth No. 225P Bronze Globe Valve that gave perfect performance for four years and 362 days in a severe boiler blowdown service where the Chief Engineer said he had never been able to keep a valve more than 60 to 90 days.

One day the Walworth representatives in that area, called upon Mr. Worthington and demonstrated the outstanding features of the Walworth No. 225P Bronze Globe Valve. This valve, which has a working steam pressure rating of 350-pounds at 550°F, has a plug-type stainless seat and disc which has been heat treated to a minimum hardness of 500 Brinell. After listening to the Walworth men and examining a 225P valve, Mr. Worthington agreed that he would try one in the severe service described. He said if it lasted 90 days, he would consider that it had done a good job.

The valve went into service and came out within three days of being in service five years under very severe operating conditions. The valve was used 24 hours a day from early in the morning on Monday until Saturday night, when it was closed until the following Monday morning. It was never opened more than three-quarters of a turn, and most of the time it was opened only one-half to one-quarter of a turn. For the life of the valve, nearly five years, it never failed to give a 100% closure when shut on Saturday night until opened Monday morning.

When another 600 hp 200-pound pressure boiler went into service, it also was equipped with a one-inch Walworth No. 225P Bronze Globe Valve on the same service.

In view of the severe service and the wire drawing to which this valve was subjected, it is interesting to note that the original valve (which was taken out of service almost five years after it had been installed) was removed – not because the seat and disc were wire drawn – but because the turbulence of the steam had finally caused a small hole to occur in the wall of the body of the valve. Needless to say, the valve that was taken out of service was replaced immediately by another one-inch Walworth No. 225P Bronze Globe Valve, positive assurance that Mr. Worthington is satisfied that this valve has "done a good job."

Other Walworth products include complete lines of Gate, Globe, Angle, Check and Lubricated Plug Valves in bronze, iron, steel, stainless steel and special alloys. Complete information and literature will be furnished upon request.

WALWORTH

60 East 42nd Street, New York 17, New York

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SERVICE
is our business

ALTHOUGH we are in the pipe and tubing business, we don't limit ourselves to manufacturing and selling our product.

We have an important service to perform . . . a service which we feel is almost an obligation; that of making certain you get the *right* pipe or tubing for every installation—at the lowest cost to you.

The next time you are in the market for tubing, get in touch with National Tube—*before* you buy. We have a technically trained Mill Service Force available to you for technical and operating assistance in meeting your tubular requirements. This Force is also available for consultation in the field. We'll be glad to evaluate your installation specifications and to recommend the material that will best meet the job requirements. The selection of the right tube for the job may save you money. And incidentally, our recommendation won't cost you a cent.

National Tube manufactures seamless pipe and tubes in a complete range of steel analyses from low carbon, through the alloys up to and including stainless steels. A wide range of sizes and wall thicknesses are available for every mechanical and pressure purpose. Let us hear from you.

See The United States Steel Hour. Televised alternate weeks. Consult your local newspaper for time and station.

WALLS WITHOUT WELDS

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(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **NATIONAL SEAMLESS PIPE AND TUBES**

UNITED STATES STEEL

HARLLEE BRANCH, JR. *Portrait by Fabian Bachrach*

"We consider it a privilege to make the Payroll Savings Plan available to all our people"

As President of Georgia Power Company, Mr. Harllee Branch, Jr., can be proud of his company's Payroll Savings Plan—more than 50% of Georgia Power's employees are Payroll Savers. They are putting more than $423,000 into U.S. Savings Bonds each year. But, Mr. Branch's interest goes beyond his own company Plan. A few months ago, as President of the Edison Electric Institute, he asked all the 185 member companies in the electric utility industry to join in an industry-wide effort to increase employee percentages in their Payroll Savings Plans.

First results of the industry campaign are now coming in. Gulf Power Company has reached 87.3% employee participation... Utah Power and Light employees have enrolled 69.6% . . . Wisconsin Electric Power reports 69.8% . . . Wisconsin-Michigan Power Company, 62% . . . Wisconsin Public Service, 57.6% . . . Lake Superior District Power, 52%.

Has every employee in *your* company been offered an opportunity to enroll in the Payroll Savings Plan? If not, communicate with Savings Bond Division, U.S. Treasury Department, Washington, D. C. Your State Sales Director will show you how easy it is to conduct a person-to-person canvass.

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SOUTHERN POWER & INDUSTRY

FISHER®

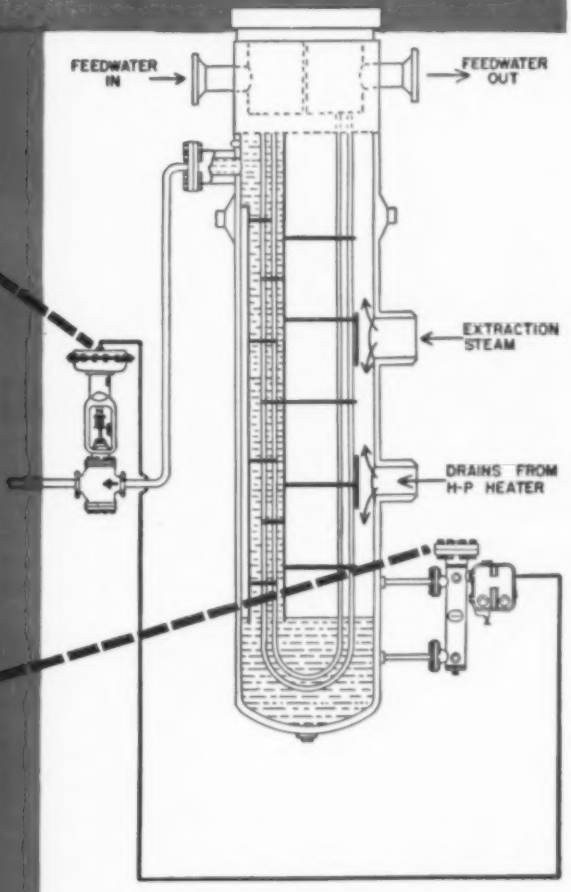
TAILOR MADE for Heater Drain Control

TYPICAL SPECIFICATIONS:

TYPE NUMBER: 657A
BODY END CONN: 2" Welding End
BODY MATERIAL: CS Chrome Moly
VALVE TRIM: 316SS, Stellited seal welded rings
INNER VALVE: Double port Throttle Plug
PACKING: Teflon
Air to Diaphragm—3 to 15 psi

TYPICAL SPECIFICATIONS:

TYPE NUMBER: 2500R—2598
CAGE MATERIAL: WCB Steel
EQUALIZING CONN: Top and bottom, F-1
CONNECTION SIZE: 2" 600 lb. ASA Flgd.
FLOAT SIZE: 3" x 14"
FLOAT MATERIAL: 304 St. Steel
TORQUE TUBE: K-monel



Years of experience in supplying control valves and Level-Trols to steam and power plants has supplied Fisher with the knowledge and ability to build heater drain equipment that will stand up, year in and year out, with a minimum of maintenance.

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CANADIAN PLANT: WOODSTOCK, ONTARIO

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

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When it comes to water conditioning . . .

HOW MUCH "TOLERANCE" CAN YOU AFFORD?

Very little, probably, if your plant is typical. You *know,* of course that exacting water treatment is required to make your local water supply precisely right for your use. But you know, too, that there are as many variations in water needs as there are industries.

As Elgin installations in hundreds of plants and institutions can testify, it is our business to design, build and install water conditioning equipment that will best meet your requirements — within exacting tolerances.

As specialists in water conditioning for nearly half a century, we have been face to face with nearly every water treatment problem imaginable. If, for example, your operations call for simple ion-exchange softening, Elgin can offer water softening equipment — in a wide range of capacities — together with an Elgin ion-exchange zeolite especially tailored to do the job with efficiency and economy. For boiler feed or process water, Elgin can provide filtration, neutralization, de-alkalization, de-aeration, de-mineralization or de-gasification. Even if you need water of *highest known chemical purity,* Elgin can offer you the Ultra-DeIonizer . . . for water of greater chemical purity than that produced by triple distillation—*at a tiny fraction of the cost.*

Talk over your water conditioning problems with your Elgin representative. The entire Elgin engineering staff is at your service to help solve the problem quickly and inexpensively. Or, if you'd rather, please feel free to write directly to us for any information you may need.

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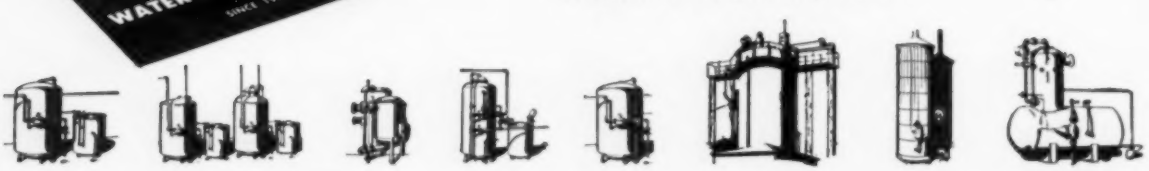
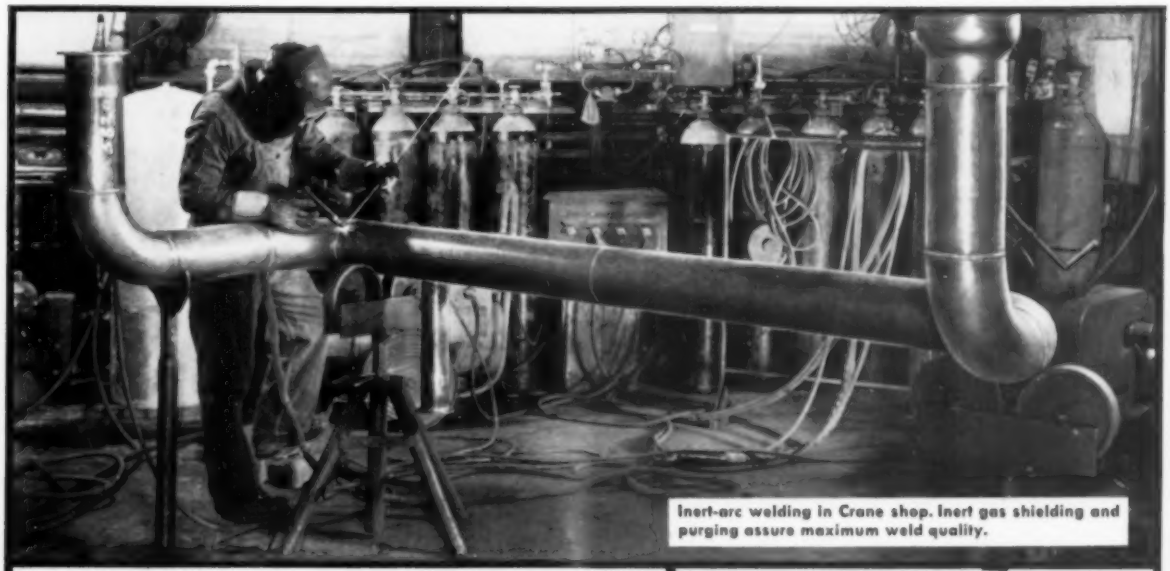
ELGIN SOFTENER CORPORATION

132 No. Grove Avenue, Elgin, Illinois

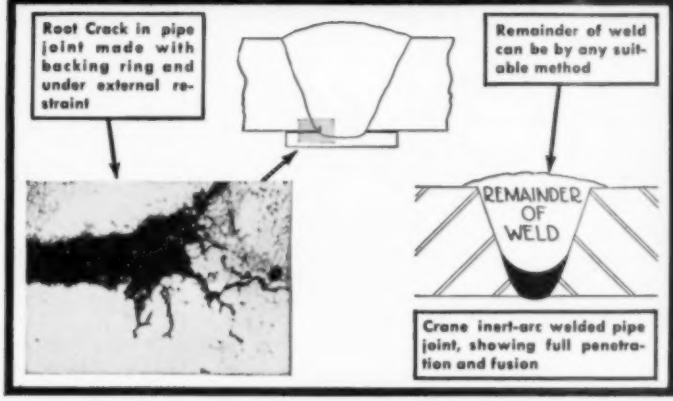
Representatives in Principal Cities

In Canada: G. F. Sterne & Son, Brantford

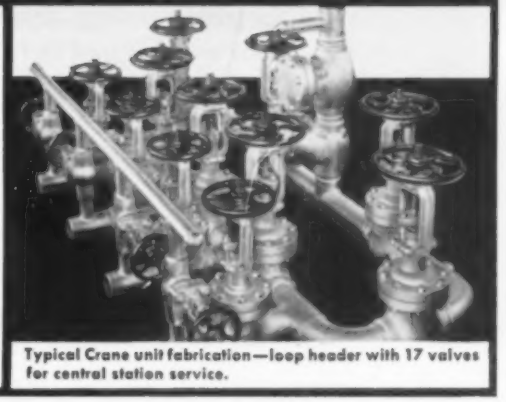




Inert-arc welding in Crane shop. Inert gas shielding and purging assure maximum weld quality.


Root Crack in pipe joint made with backing ring and under external restraint
Remainder of weld can be by any suitable method
REMAINDER OF WELD

Crane inert-arc welded pipe joint, showing full penetration and fusion



Typical Crane unit fabrication—loop header with 17 valves for central station service.

Crane-developed butt-welding technique assures more efficient power piping

Gives important advantages—eliminates backing rings

On shop fabricated assemblies, Crane inert-arc *first pass* welded butt joints are making significant contributions to modern power plant operation.

By eliminating backing rings as used with metal-arc welding, the Crane inert-arc first pass technique assures a high quality weld with smooth root contour without crevices. It eliminates the possibility of basal cracks sometimes associated with backing rings or the characteristics of the base material.

The practicability and dependability of Crane inert-arc *first pass* welding have been thoroughly demonstrated. Leading power plants have been enjoying its advantages for several years, particularly on heavy wall alloy piping for main steam service, and on Schedule 160 carbon steel boiler feed piping.

Welding all types of heavy wall alloy power piping is just one of Crane's services to the power industry. Crane handles every phase of unit fabrication for headers, assemblies and valve groupings—simple or complex, large or small. See your Crane Representative for expert assistance on all power piping needs. Write to address below.

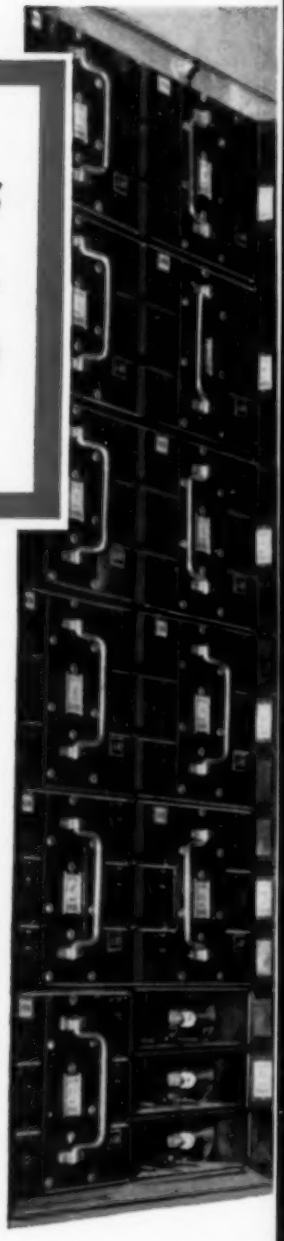
CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

. . . "After these two experiences with FUSETRON dual-element Fuses, we use them throughout our Entire Plant."

J. W. Sanders, CHIEF ELECTRICIAN
(Division of Simmons Co.) ROSEMARY MFG. CO.
ROANOKE RAPIDS, N. C.



"SOLENOIDS WERE BURNING UP AND STARTING *FIRES* — *Until we changed to FUSETRON FUSES.*"

"A fire in our weaving room is just about the gravest danger we can face. If the fire isn't checked immediately, it can quickly spread throughout the room.

"You can imagine then how concerned we were with fires started by solenoids burning up in heavy lint locations. With 500 looms in use in 3 weaving rooms, we didn't know where to expect the next fire.

1

"We definitely had to find safer solenoid protection than we were getting from one-time ordinary fuses in use. We decided to try Fusetron dual-element fuses and installed them in the summer of 1954.

"It was a big relief when Fusetron fuses turned out to be the answer. I'll knock on wood, but we haven't had a fire since we installed them.

"In addition, this move to Fusetron fuses also cut production costs. We eliminated needless down-periods and we no longer have to repair or replace burned-out solenoids."

"WE CUT UNNECESSARY DOWN-TIME AND MAINTENANCE *COSTS By installing FUSETRON FUSES.*"

"Several years ago we had a heating problem in our main panels that was causing ordinary renewable fuses to blow.

"These outages occurred several times weekly in each panel, so down-time costs were really adding up and costing our company money.

"Also, after each blow our maintenance men would spend time checking the circuit for trouble, only to find the outage was caused by excessive heating in the panel.

2

"We discussed the situation with a salesman and he showed us that Fusetron dual-element fuses were cooler operating and would eliminate our trouble.

"They sure did! The change to Fusetron fuses of proper size for safe protection was completed in 1953. We haven't had any unnecessary shut-downs since then.

"Our maintenance men sure like the change. Any outage today indicates trouble, and the men know they are not wasting time when they check the circuit.

"Because of this and other satisfactory experiences with Fusetron fuses, we individually protect all our motors with them as well as using them throughout the rest of the electrical system.

"I wish we had kept a record to show how much money we saved by equipping each motor with Fusetron fuses. I am reasonably certain that the difference in motor burnouts alone would represent considerable money."

You too, CAN REDUCE FIRE HAZARDS AND DOWN-PERIODS *by installing FUSETRON FUSES!*

They provide 10 Point Protection

1. High interrupting capacity—protect against heaviest short-circuits. Have proven on tests to open safely on circuits set to deliver in excess of 100,000 amperes.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating—lesser resistance results in cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloads.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

Write for bulletin FIS.

FOR LOADS ABOVE 600 AND UP TO 5,000 AMPS., *Use BUSS Hi-Cap Fuses . . .*

They have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

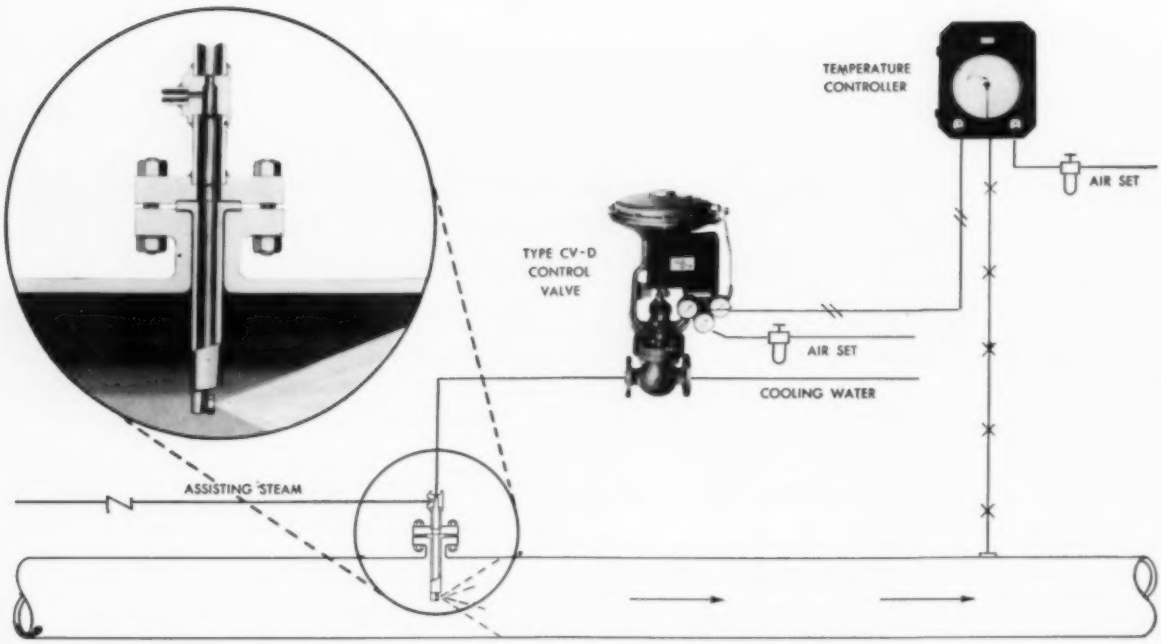
Write for bulletin HCS.

J. W. Sanders
CHIEF ELECTRICIAN

Play Safe! Install FUSETRON dual-element Fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

BUSSMANN MFG. CO. Div. McGraw Electric Co.
University at Jefferson St. Louis 7, Mo.



Normal installation of a Copes-Vulcan Steam-Assist Desuperheater is shown schematically

Get more accurate control with the NEW Copes-Vulcan Steam Assist Desuperheating Station!

Both carburetor and in-line types are available in the new Copes-Vulcan Steam-Assist Desuperheater

Here is a desuperheater based on a new, proven principle that delivers more accurate control of final steam temperature for process work or auxiliaries. It uses steam only on lighter loads. As load increases, the flow of assisting steam is automatically reduced—normally without an atomizing-steam valve. Assisting steam can be off completely at high loads where no more than mechanical atomization is needed. Control is close, even at 10 degrees above saturated temperature.

Cooling water and assisting steam are intimately mixed in the exclusive Swirl Chamber—upstream from the point of injection. No large steam bubbles form to cause annoying hammer or vibration.

Incorporated into the station for close modulating control of cooling water flow is the new Copes-Vulcan Type CV-D Valve. It is designed for the exact operating characteristics suited to your needs.

Enjoy the benefits of Copes-Vulcan desuperheating, custom-engineered for your individual requirements. Be sure of accurate control, minimum maintenance and long service life. Write for Bulletin 1024.

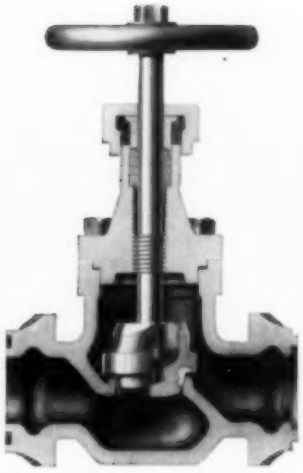
COPES-VULCAN DIVISION

BLAW-KNOX COMPANY

ERIE 4, PENNSYLVANIA

50th Anniversary
BLAW-KNOX
1906-1956

COPES VULCAN



Frick valves have high-angle seats and oversized stems, are good for various high-pressure jobs.

Time-tested

Valves and Fittings

Are preferred for cooling systems using ammonia, Freon, or other refrigerants—as well as for high-pressure work in many industries. Full line of sizes, 1/4" through 14". Handle pressures of 300 to 1500 lbs., according to size. Flanged and screwed types, offering many exclusive advantages.

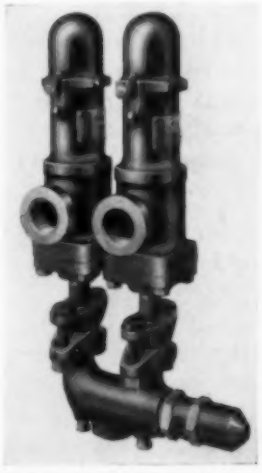
Stocked by Frick Distributors in principal cities, the world over. Write now, on your letterhead, for new loose-leaf catalog, which gives prices, weights, dimensions, parts lists, allowable pressures and useful tables.

Flanged angle valve having seal-cap, for use with Freon.

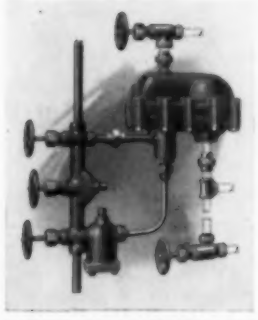
DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

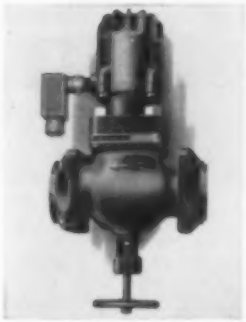
WAYNESBORO, PENNA. U.S.A.



Two safety valves mounted above a dual-outlet valve.



Float valve controls and bypasses, in a range of types and sizes.



Electric control valves, in sizes 1" to 2½".

Get this new catalog by writing today.

No. 1 on the List

for small forged steel gate valve jobs

CHAPMAN LIST 960

You'll find more Chapman List 960 valves on more jobs than other small forged steel gate valves. For standing up and keeping maintenance costs down it's tops, by far, on the valve man's preference list. The reasons are sound and several.

Wedge gate faces are super hard . . . hardened to 800 Brinell by Chapman's exclusive Malcomizing process. They won't . . . *they can't* seize or gall. Easily replaceable seat rings are hardened stainless steel. Wear on seating surfaces is brought to a minimum. Bolted follower on the outside screw rising stem type has no exposed threads on its yoke . . . nothing that's easy to corrode.

Made to take . . . and stand up under . . . pressures from 380 psi at 1000° F. to 2000 psi at 100° F. (For higher ratings use Chapman List 990 valves.) Sizes from ¼" to 2" in many different alloys. You can have either rising stem with yoke or rising stem with inside screw. And, depending upon your needs, the Bonnet joint is either ground metal-to-metal or gasketed.

Catalog 10 has full information. It's required reading for men interested in valves. Write for your copy today.

THE CHAPMAN VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASSACHUSETTS

TIMELY COMMENTS

The BIG and the SMALL Companies

RESPONSIBLE management today knows the difference between fair competition and destructive competition. Big companies seek expansion for the whole economy as well as for themselves. They encourage the growth of smaller enterprise both inside and outside the industry.

These comments were made by **Robert S. Lynch,** president of Atlanta, Georgia's progressive and expanding **Atlantic Steel Company.** His recent address before The American Iron and Steel Institute's New York City Annual Meeting was "What Steel Means to the South—and the South Means to Steel" but the constructive thoughts are applicable to all types of Southern and Southwestern manufacturing operations.

"However small a company may be, in comparison with great companies elsewhere, it still looms big in the eyes of its own community. Its work, furthermore, is visible from every angle. Everybody can see it making steel, making labor relations, working for economic progress. The community has a close-up view of its effect —for better or worse—on practically every life it touches. Is it not natural, then, that it stands before the community as the entire steel industry, in all its ramifications?

"We can all agree, perhaps, that every small company should realize that its own neighbors' views of the whole ten billion dollar industry (reaching from coast to coast) start right with its own performance. This means above all, that the local company can't hope to borrow a good reputation from the rest of the industry. It must try, instead, to contribute to that reputation itself—if it wants to win friends, and secure the confidence of helpful people.

"Responsible management today knows the difference between **fair** competition and **destructive** competition. It knows that the **American** way is the **fair** way—that when small enterprise can no longer step out, and battle on its **own** ground for its **own share** of our **growing** markets, then the end of the **American way** is **sure.** And that would be the end of **all** free enterprise —including the biggest.

"Most of today's large and prosperous corporations have learned how to live and operate happily in a gold fish bowl. While a billion dollar corporation is private enterprise, it lives as a public institution. Its management men have learned what living up to public responsibility really means. It means doing the right thing because **you want to.**

"The small businessman and the small enterprise—working unnoticed—can sometimes live a somewhat opportunistic life, and get by. You and I know that today's responsibly managed corporation **does not,** and **cannot.**

"Prosperity is just as important to the southerner as to any one else. But good wages and dividends alone do not, and will not, make for loyalty to industrial management. **People aren't prone to attach deep loyalties to something they view purely as a money making machine.**

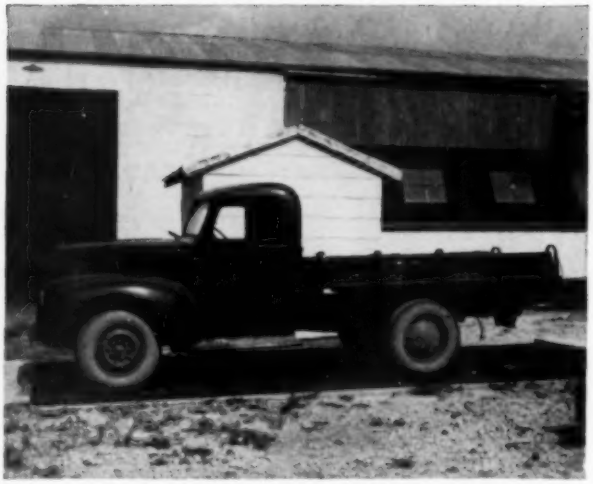
"The southerner, especially, views himself as more of a human being than the economic man described in the older textbooks. And what people in the South believe in is leadership which not only shares their own larger views of purpose, but expresses in action their own traditional feeling that **organized industry exists for people,** and not the other way around."

BORDEN
First IN FLOOR GRATING

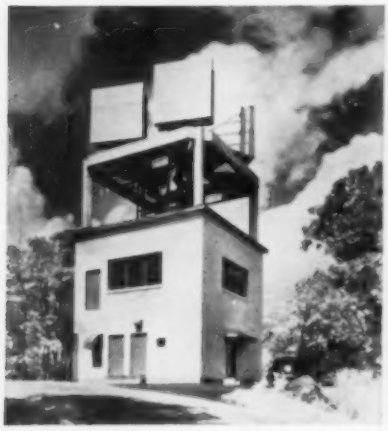
USES OF GRATING . . . WHERE ONLY BORDEN QUALITY WOULD DO . . .

Here on this page are a few of the many new or unusual uses for grating being pioneered every day. Each is an exacting job where only standards of quality equal to BORDEN'S will do.

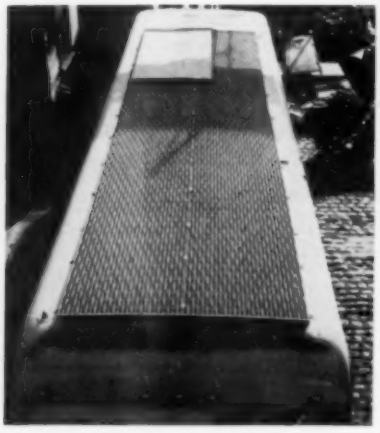
And remember . . . BORDEN manufactures every type grating in ferrous and non-ferrous metals.



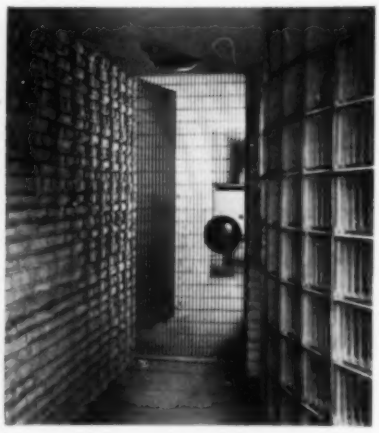
GRATING PLATFORMS for Scales . . . Will not collect snow, ice or become waterlogged; need balancing much less frequently; require no maintenance, yet bring you years of reliable service.



Television relay stations and radar stations that gird our continent have adopted grating as standard outside platform material. It will not collect snow as most other platforms will.



Wherever this Color Television truck goes, whatever the assignment of the reporters who must mount its roof, Borden riveted *serra-crimp* grating will mean surerfooting —even in ice or snow.



Only the finest precision manufacturing would satisfy the architect who designed this door. BORDEN is recognized as a leader in quality, custom-manufactured gratings.

See our Catalog in Sweets

BORDEN METAL PRODUCTS CO.

Gentlemen:

Please send me BORDEN Catalog

NAME .....

TITLE .....

COMPANY NAME .....

ST. AND NO .....

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Write for complete information on BORDEN All/Weld, Pressure Locked, and Riveted Floor Gratings in this FREE 8-page catalog

BORDEN METAL PRODUCTS CO.

853 GREEN LANE ELizabeth 2-6410 ELIZABETH, N. J.
SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.

INDUSTRY SPEAKS

SOUTHERN POWER AND INDUSTRY

The South's "Second Industrial Revolution"

Abstracted from comments of

O. PARKER McCOMAS, President
Philip Morris Incorporated

at the Annual Meeting of Stockholders of Philip Morris Incorporated held in Richmond, Virginia, on April 10, 1956.

ALTHOUGH we are part of the nation's oldest industry, I want to stress the fact that we are endeavoring, at every turn of our operation, to utilize the tools of modern science and modern management to keep abreast of our consumers and ahead of our competition.

These same tools have not only helped us, but have also brought the South to be the fastest growing, most progressive industrial section of our country today.

In the past ten years alone, this company has contributed more than $2,000,000,000 to the economy of the South. That sum can be multiplied many times in its total effect upon the financial community as it went into circulation in the tobacco growing areas, in the box and paper mills, in the chemical plants, trucking and rail lines, newspapers, radio and television stations, retail stores, taxes and in the myriad ways the dollar can move in our dynamic economy.

These figures of Philip Morris are reflected in the even larger picture of the growth of Southern industry. The South's proportion of the nation's manufacturing facilities has increased from 9% in 1900 to nearly 25% in 1954. Considering the fact that in most cases these plants are new and modern, the outlook for continued expansion in the industrial field is most optimistic.

By other indices as well, one can measure the tremendous growth of our region. Since 1930, personal income in the South has increased 420% against a national increase of 270%. In those same years per capita personal income has increased 300% in the South against a national increase of 185%. Thus, while personal per capita income in the South in 1930 was only 50% of the national average, today it is up to 70%. Wages of production workers from 1929 to 1953 rose 440% in the South against 350% in the nation. Electric power production since 1935 has increased 760% against 380% for the nation as a whole. New and important consumer markets have been opened for our products as the region's economy expands.

As against these cold statistics of the region's growth, one must look to even more dramatic and exciting news of the South today—diversification. Once solely the home of textiles and tobacco, the South today is among the most diversified industrial areas of our nation.

Petroleum-coal products, chemicals, food manufacturers, paper pulp, metals, plastics, machinery manufacturers are among the many new industries to come into the South. Today tobacco ranks as only the sixth largest industry in the region—although by far, the largest in terms of the percentage of the total national industry it commands.

Frankly, Philip Morris welcomes this diversification of the South. It brings to us new neighbors whose products and technical skills are of benefit to our company. Examples of this are to be found in our excellent working relationships with Tennessee Eastman in Kingsport, Tennessee, the developers of our fine Marlboro filters; Ecusta Paper in Pisgah Forest, North Carolina who make our superior cigarette papers, formerly imported from overseas; our aluminum foil suppliers, and our cellophane manufacturers to enumerate but a few.

These new industries also tend to create a better balance within the communities and states, equalizing the financial burdens and lessening the dependence of the region on the prosperity of single industries. Equally important has been the general upgrading of the living standards, cultural achievements and educational levels of the South.

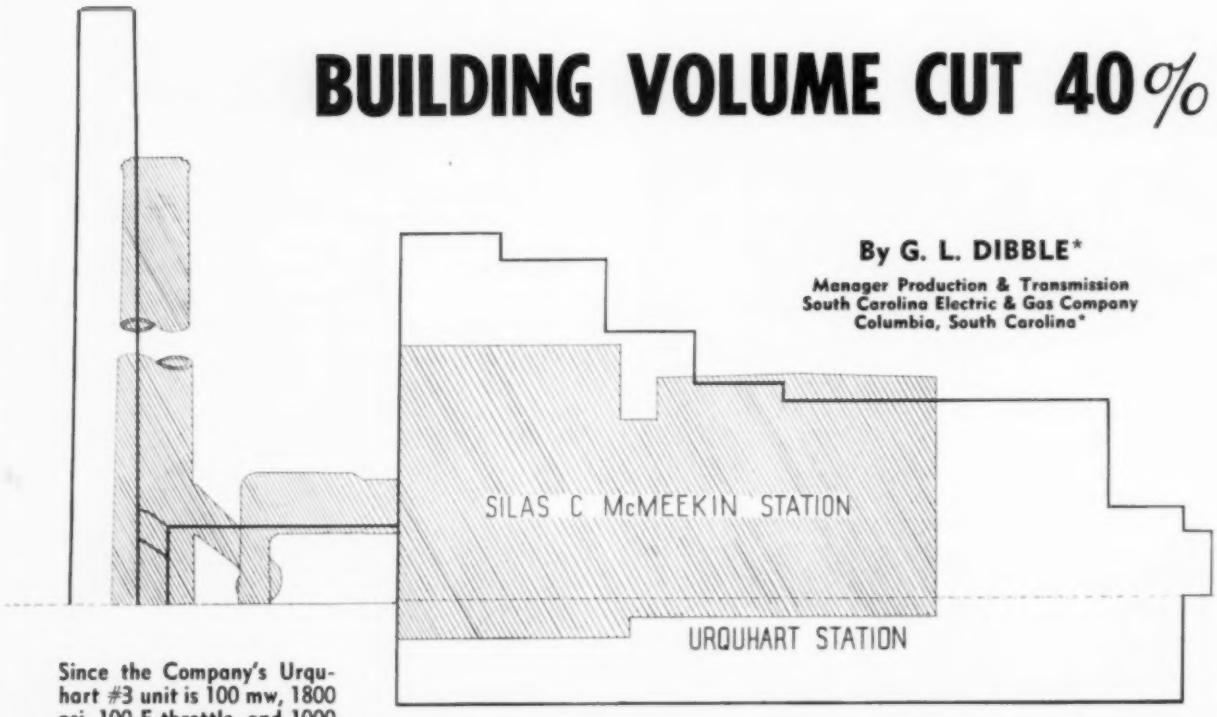
I point to these achievements of the South, because we at Philip Morris consider ourselves good citizens of the region in which we carry on our main activities. The South today stands on the threshold of the "Second Industrial Revolution," potentially the greatest economic expansion in the history of our country, in any comparable period of time.

South Carolina Company Gets More for Its Money by Using Forced Circulation Boiler and Cross-Compound Axial Exhaust Turbine to Save Building Space, Steel, Piping and Cable.

BUILDING VOLUME CUT 40%

By G. L. DIBBLE*

Manager Production & Transmission
South Carolina Electric & Gas Company
Columbia, South Carolina*



Since the Company's Urquhart #3 unit is 100 mw, 1800 psi, 100 F throttle, and 1000 F reheat a fair comparison with McMeekin #1 can be made. If the McMeekin boiler were totally enclosed like Urquhart, building volume for the newer design would be 15 cu ft per kw compared to 25 cu ft for the older plant.

A TWENTY-THREE county area of Central, Western, and Southern South Carolina is served by the South Carolina Electric & Gas Company. The fact that our territorial load has increased 201% in the last 10 years makes us justifiably proud of the slogan, "We have never had to refuse service to any customer, regardless of size, due to a shortage of power."

Power supply studies, started in 1952, indicated the need for a new generating station located in the Columbia area to be in service during 1958. Studies of the economics narrowed the location to an area adjacent to our Saluda Hydro Plant on Lake Murray, approximately 15 miles west of Columbia. It was here that the lowest plant investment was possible, the lowest transmission investment and losses were obtained, and due to the abundance and low temperature of cooling water, the lowest plant overall operating cost was to be had.

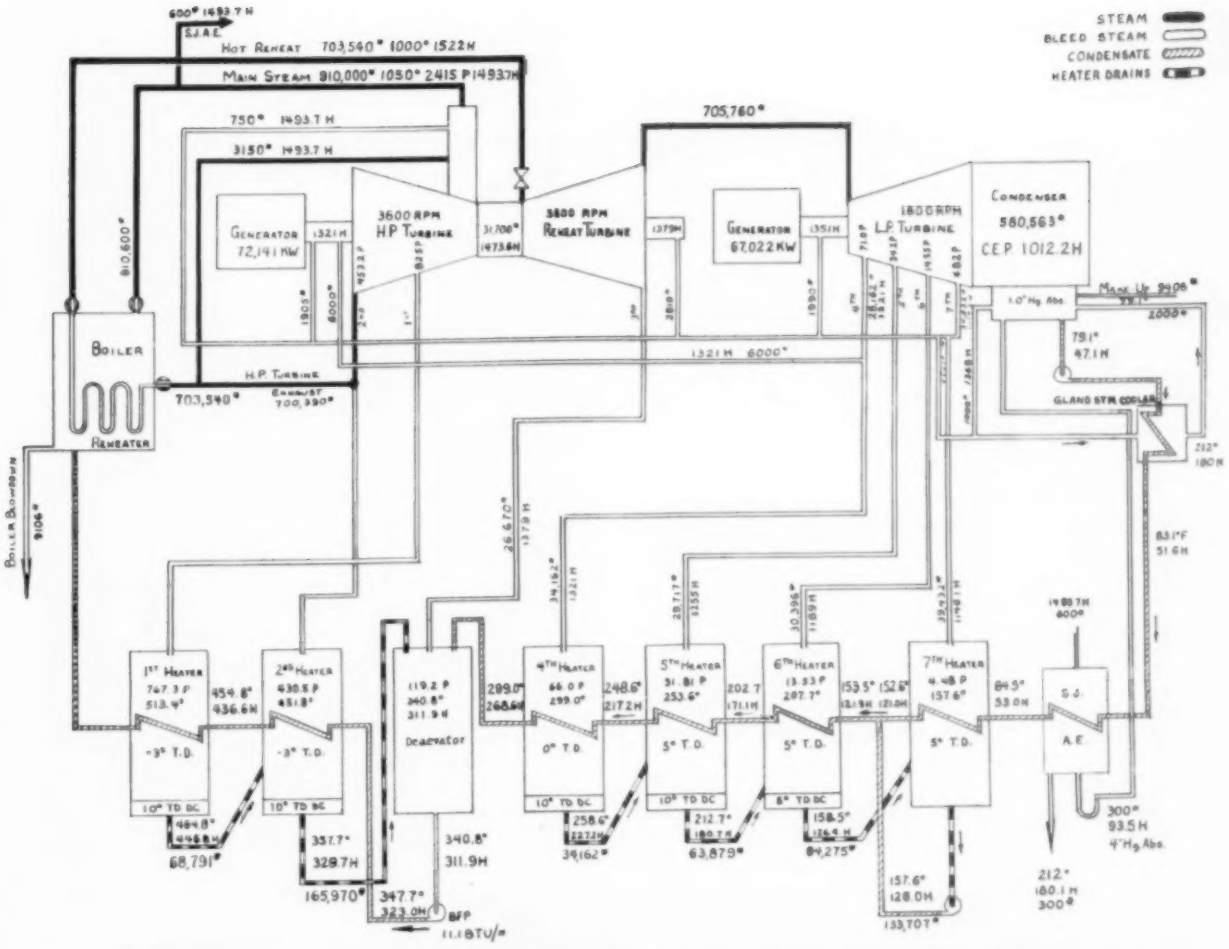
Boiler

Getting around to plant details, our first look was at the boiler and its enclosure. Since our turbine had been selected as 125 mw nameplate, 2400 psi, 1050F superheat and 1000F reheat, the boiler size would be in the neighborhood of one million pounds of steam per hour. This we recognized as being a structure forty or so feet square suitably surrounded with the usual amount of air ducts and breeching and standing majestically over 150 ft in the air, requiring the use of large and expensive boiler columns. In order to operate and service this monster it would be necessary to establish a minimum of five levels above the operating floor with additional building steel, gratings and stairs.

We recognized controlled or forced circulation boilers as the proven type design which could lend itself to a substantial reduction of boiler height, and consequently building cost. After considerable design development and negotiation, Combustion Engineering Company boilers were selected. We arrived at a 910,000 lb/hr 2775 psi drum design, 1050 FTT superheater outlet and 702,000 lb/hr reheater flow at 1000 FTT outlet, having an overall height from the bottom of the ash pit to the top of the boiler steel of 90 ft. The furnace is 41 ft wide and 21 ft deep with division wall and a volume of 52,000 cu ft.

The furnace is fired by 16 adjustable tangential burners, sup-

*Abstracted from paper presented to the Engineering and Operating Section of Southeastern Electric Exchange.



The heat balance for McMeekin station utilizes four low pressure heaters, one deaerating heater and two high pressure heaters. Much was gained by using vertical heaters arranged for minimum piping and located for convenient servicing by the turbine room crane.

plied with pulverized coal from four Raymond #593 bowl mills with separate feeders. Three canned motor type boiler circulating pumps are installed for positive water circulation with two pumps being adequate for operation at full boiler rating.

The superheater has a surface of 75,000 sq ft and is of the four section type with interstage desuperheaters. The reheater has desuperheaters at the inlet and is a two section design with 16,000 sq ft. The economizer is of the horizontal fin tube type with 39,000 sq ft. Two Ljungstrom regenerative air heaters having a total surface of 176,000 sq ft reduce the temperature of the gas leaving the economizer from 640 F at full rating to 268 F uncorrected. Combustion air temperature is increased from 80 F to 555 F.

The boiler has a predicted performance of 89.55% efficiency at 910,000 lb/hr. Other boiler appurtenances are Diamond Power Specialty Company, Multiport water gauges, soot blowers and furnace television; Consolidated Maxflow safety valves; and Republic Flow Meters Company superheat and reheat steam temperature control. The use of both radiant and convection superheating and reheating surfaces will allow full steam temperatures to be maintained over the operating range of the turbine.

It was decided in the interest of reducing building wall cost and simplifying ventilation problems to leave the hottest portions of the boiler out of doors. Therefore, the superheater and economizer section of the boiler, the airheaters, and fans are not enclosed. It should be noted that this arrangement provides for a minimum of auxiliary elevations, and a minimum of hot air ducts and breeching. The connections for the main steam and hot reheat lines are located at the lowest possible elevation and thereby results in a considerable savings in piping cost. These two steam lines are approximately 135 ft shorter than those of our conventional design.

Turbine

Several conferences with General Electric design engineers disclosed that 125 mw might not be too small economically for a cross compound machine. Also they ex-

(Continued on Page 79)

Florida Electrical Repair Center

Soft Grit Cleaning Procedures

SOFT GRIT blasting, one of the newer developments of airless abrasive blasting, has made cleaning of large armatures much less expensive in a Jacksonville, Florida, repair center. Both the manpower and the time needed are reduced.

Typical Operation

A typical operation is the rebuilding of traction motor and generator armatures that range from 1800 to 6000 pounds in weight. The blast cabinets, designed by Wheelabrator Corporation, Mishawaka, Indiana, have blasting compartments 7'6" wide and 8' long, accommodating one armature core at a time. Only one man is required to attend the cabinet.

The cores are set, by means of an overhead crane, onto a work car. This car carries them in and out of the cabinet. The car is set on rail tracks for ease in movement. The armature shaft rests on free-acting rollers at each end of the car. The rollers and the head on which the cores are mounted are adjustable so that this cabinet can be used for all of the many sizes of armatures handled.

Rotation of the armature core in the blast compartment is accomplished by a rubber-tired wheel in continuous contact with the core.

Closed Cabinet

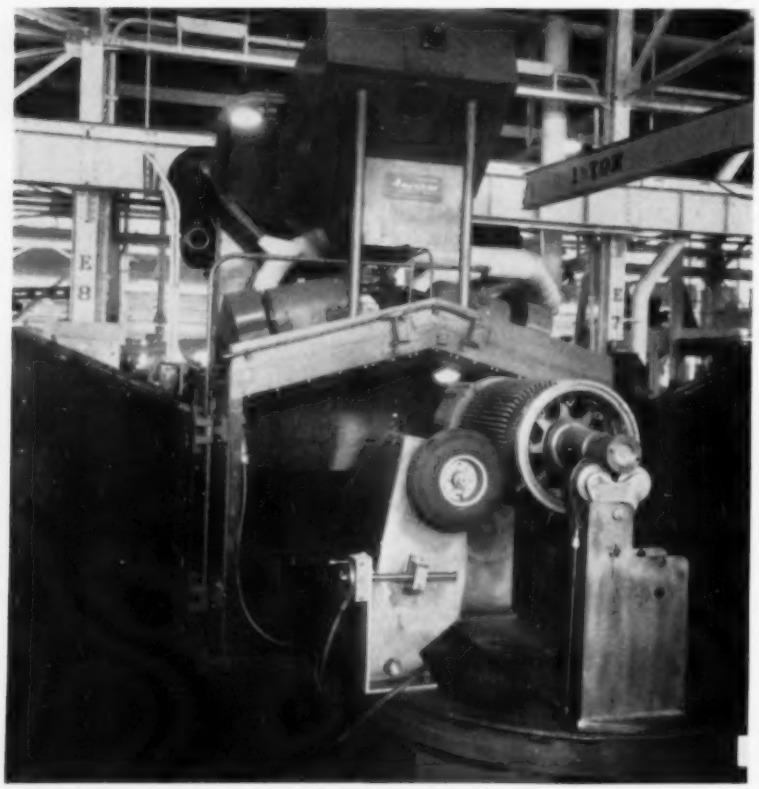
Once the core is inside the cabinet, the doors are closed, and it rotates at a very slow but constant speed under an avalanche of soft-grit abrasive thrown centrifugally from two rotating, bladed wheels within the cabinet. These are in the cabinet roof. They work on two sides of the core at once. Soft-grit abrasive is used to avoid contamination of the armatures with anything metallic. Abrasive particles are automatically reclaimed.

Performance

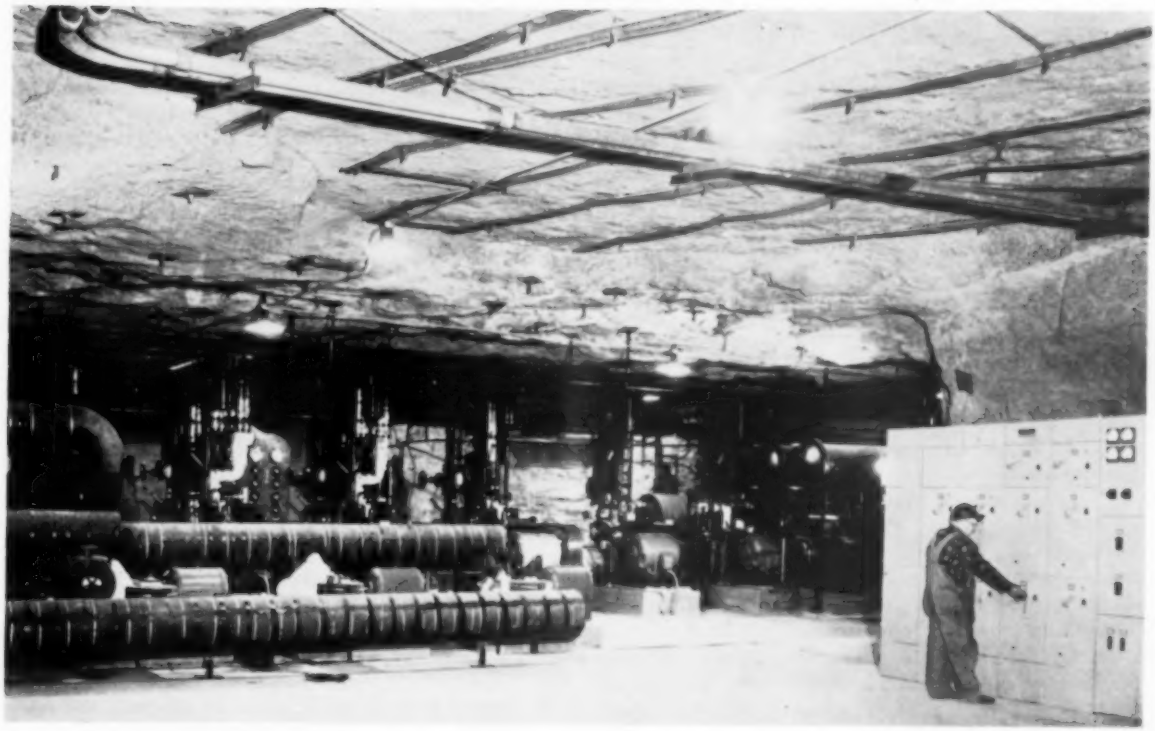
A large generator armature core weighing 6000 pounds rotates under the blast at the rate of about one complete revolution per 30 to 45 minutes. Guards protect the commutator. After one revolution of the core, the table is revolved 180 degrees. The core is blasted for another period of the same length. Attack upon the contaminants from both angles assures their thorough removal. The smaller traction motor armature cores, weighing 1800 pounds, can be blasted in a total time of around 20 minutes.

Preparation

Only a minimum of preparation is done before the cores are blasted. The used armatures received for rebuilding, are degreased in a separate corn cob blast chamber before electrical tests. Each armature is electrically tested after degreasing, to determine whether rewinding is necessary. If it is, the coils are cut and stripped out. The largest deposits of mica are scraped off, and the core is carried over to the blaster for fast cleaning.



Blast cleaning generator and motor armature



Distribution load center and refrigeration equipment at the Inland Cold Storage plant.

Power for Underground Freezer

A NINE-ACRE underground cave carved out of solid limestone has been converted into a unique underground freezer — the first of its kind in the United States.

Conduit

At the Inland Cold Storage Company's freezer warehouse at Kansas City, Kansas, built to facilitate interstate movement of frozen foods from the west coast to the eastern markets, General Electric rigid steel conduit carries the cables from the substation located above ground down through 70 ft of solid stone into the ceiling of the worked-out section of the former quarry and thence to the distribution load center.

In all, approximately 9½ miles of conduit are used for the electrical distribution system which supplies power for refrigeration equipment for more than 300,000 sq ft of storage space and for the lighting and other electrical equipment.

Extreme Conditions

The storage area in this warehouse can handle 2,500 carloads of frozen food. Refrigeration keeps 275,000 sq ft of the area at a constant temperature of —5 F. Another 50,000 sq ft is kept at 32 F.

Serving the freezer warehouse is a railroad spur capable of bringing 18 cars at one time to the loading platforms which are located underground. In addition, a truck dock, at the entrance to the plant, is designed to handle 15 trucks simultaneously.

The G-E White conduit installation is subjected to several extreme conditions. It must withstand alkalis and acids in the soil and rock as it bends down into the former quarry. It must also resist moisture and humidity in the storage and refrigeration areas. In many places, the conduit is constantly covered with ice.

COMPRESSOR MAINTENANCE

Illustrations and Data Courtesy
COMPRESSED AIR AND GAS INSTITUTE

FROM AN OPERATING and cost savings standpoint, the proper care of air compressing equipment is of major concern. It makes little difference whether the unit is a reciprocating or rotary, positive displacement type, or a large centrifugal dynamic type—when it comes to applying maintenance measures designed to eliminate breakdowns, proper compressor care cuts operating costs.

A study of compressor maintenance reveals many basic essentials and a large number of incidental requirements, each contingent upon the type compressor and particular operation. For example, the installation and care of a stationary reciprocating compressor has an important bearing on care and maintenance.

Accessibility: The compressor should be located in a clean, well lighted area of sufficient size to permit cleaning, ready inspection and any dismantling which may be necessary, such as removal of pistons, wheels, crankshaft, or intercooler tube nest.

Foundation: Compressor manufacturers regularly furnish drawings of the required foundation and base areas necessary to accommodate industrial and power plant units.

The character of the subsoil should be ascertained by borings on the site of the foundation. Such borings should be at least four in number, one near each corner of the proposed foundation. Borings should be made by a competent foundation contractor who is able to recommend suitable construction. In some cases, it may be necessary to spread the weight of the compressor and foundation over a larger area by providing a concrete mat below the foundation block. Where subsoil is especially soft or water-bearing, the mat itself should be supported on piles and properly braced.

The foundation block and the mat, if used, should be cast in a single pour, but the mat and the block may be poured separately, in which case they should be anchored together by vertical bars.

To minimize transmission of vibration, the walls and floors of the compressor room should be separated from the compressor foundation. It is also well to surround the portion of the foundation that is below ground with 18 inches of coarse dry gravel and to separate it from the adjacent floor by a narrow gap or by a vibration insulating material, such as asphalt.

If a plant is designed without a basement, trenches for piping should be provided. These should be carefully planned before the piping layout has been completed. The width and depth of pipe trenches should be given consideration in order that flanges, valves, unions, and joints will be accessible. The number of pipe trenches should be held to a minimum. Therefore, the piping layout should be such as to make possible the simplest and most accessible arrangement to facilitate proper operation and maintenance of the plant. The appearance of the plant may be greatly improved by the use of a simple pipe - trench arrangement and cover design.

Proper installation cannot be overstressed. Installing a compressor correctly is very important to the successful operation of the equipment and the ultimate maintenance of the unit.

Air Intake: The pulsations surrounding the air intake of a compressor may rattle windows and could damage a weakly constructed wall. As a safety measure, as well as to eliminate excessive noise, the air intake opening should be some distance from a window or wall.

Atmospheric Conditions: Where an excessive amount of dust and dirt are present in the air, an air filter would be installed on the intake valve. This eliminates the possibility of dirt being sucked into the compressor and causing wear of working parts. Caution should be taken never to locate an air intake near a steam exhaust head, or an outlet fan from a room containing dust particles or fumes.

Intake piping should be the full diameter of the intake opening and as short and direct as possible. Standard steel or sheet metal pipe makes the best intake pipe above floor, while vitrified pipe is better suited for underground installations. Pipe joints should be cemented to make them watertight. Water seeping into the intake is carried into the cylinder, washing away the lubricant and causing the piston and cylinder to wear. If a concrete duct is used as an air intake, it should have a smooth, hard interior surface. Where compressors are used in the vicinity of acid fumes which cause corrosion, special precautions should be taken. The compressor manufacturer knows how to combat this condition and should be consulted prior to setup.

Air Discharge: Discharge pipe should run directly to an aftercooler and should not be smaller than the full size of the compressor outlet. (Fig. 1) Discharge pipe should run directly to the air receiver if no aftercooler is used. (Fig. 2) The air receiver should be outside if possible and as close to the compressor as practicable. A hot discharge line should not contact wood or other flammable material. If the line is more than 100 ft long, pipe of the next larger

diameter should be used. Unnecessary pockets should be avoided. If a pocket is formed between the compressor and the aftercooler or receiver, it should be provided with a drain valve or trap to avoid accumulation of oil and moisture.

Pipe line surges or pulsations may be set up in the intake or discharge lines under certain conditions of installation and operation. Such surges, or pulsations, may cause vibration of the pipe. This may necessitate additional horsepower to drive the compressor.

A common cause of pressure surge in the discharge line is the installation of a line which is too long and which has a receiver located at a considerable distance from the compressor. However, the surge may be avoided by installing a surge drum as near to the compressor as possible. A surge drum, located in such a position, will dampen out the pulsation.

Pipe lines through which hot air passes should be kept clean to avoid the danger of fire starting in the accumulated dirt and oil. Piping should drain toward the aftercooler and receiver. All piping should be arranged with flanged fittings or unions close to the compressor to permit removal of the cylinder at any time without disturbing the piping. Overhead piping should be well supported to receive the compressor of unnecessary strain.

Moisture Traps: Maintaining an air line free of moisture is essential to the effective operation of the complete unit. Eliminating moisture in the line can be accomplished by inserting traps in the lines at frequent intervals. (Fig. 1) Traps should be located at low points in the line and ahead of outlets. Automatic moisture traps can be purchased for this purpose or trays may be made of pipe fittings, consisting of tees having

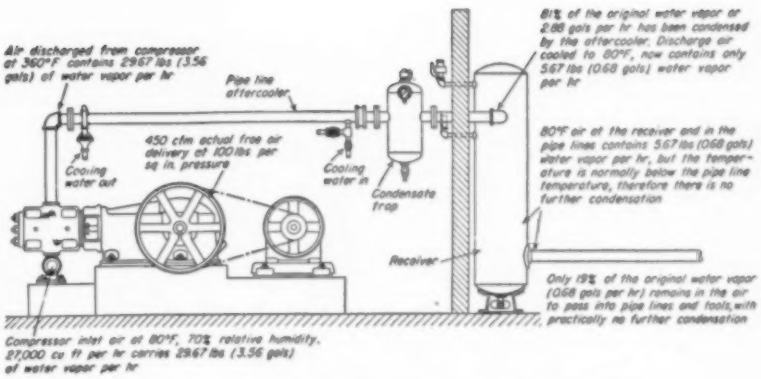

Air discharged from compressor at 360°F contains 29.67 lbs (3.56 gals) of water vapor per hr
Pipe line aftercooler
81% of the original water vapor or 2.88 gals per hr has been condensed by the aftercooler. Discharge air cooled to 80°F, now contains only 5.67 lbs (0.68 gals) water vapor per hr
450 cfm actual free air delivery at 100 lbs per sq in. pressure
Cooling water out
Cooling water in
Condensate trap
80°F air at the receiver and in the pipe lines contains 5.67 lbs (0.68 gals) water vapor per hr, but the temperature is normally below the pipe line temperature, therefore there is no further condensation
Receiver
Only 19% of the original water vapor (0.68 gals per hr) remains in the air to pass into pipe lines and tools, with practically no further condensation
Compressor inlet air at 80°F, 70% relative humidity. 27,000 cu ft per hr carries 29.67 lbs (3.56 gals) of water vapor per hr

Fig. 1. Arrangement of discharge pipe and aftercooler.

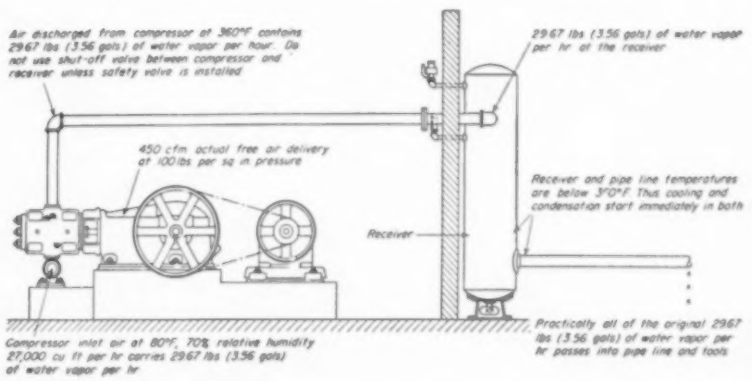

Air discharged from compressor at 360°F contains 29.67 lbs (3.56 gals) of water vapor per hour. Do not use shut-off valve between compressor and receiver unless safety valve is installed
29.67 lbs (3.56 gals) of water vapor per hr at the receiver
450 cfm actual free air delivery at 100 lbs per sq in pressure
Receiver and pipe line temperatures are below 370°F. Thus cooling and condensation start immediately in both
Receiver
Compressor inlet air at 80°F, 70% relative humidity 27,000 cu ft per hr carries 29.67 lbs (3.56 gals) of water vapor per hr
Practically all of the original 29.67 lbs (3.56 gals) of water vapor per hr passes into pipe line and tools

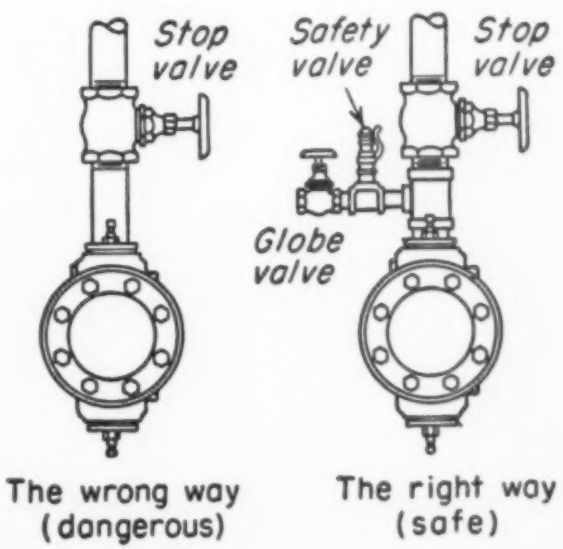
Fig. 2. Discharge pipe should run directly to the air receiver if no aftercooler is used. Air receiver should be outside, if possible, and as close to the compressor as practicable.

VALUE OF GATE VALVE — A globe, or gate valve may be placed in the discharge line between the compressor and aftercooler, or between the compressor and receiver when more than one compressor discharges into a single aftercooler or receiver.

When such a shutoff valve is used a safety valve must be placed in the pipe line between the cylinder and the shutoff valve.

This is very important — for the compressor may be started at some time with the stop valve closed. If no safety valve is used, sufficient pressure may build up to burst the cylinder.

The safety valve or valves should have a total capacity more than sufficient to handle the entire output of the compressor.



a pipe leg hanging down with a drain connected to the bottom. Traps, however, are effective only where the air has already been cooled and the moisture precipitated. In the majority of installations, where the air is not allowed to stand unused for any period of time and there is little opportunity for it to cool, an aftercooler should be used to cool the air so that its moisture can be precipitated and removed.

Testing Compressors

Testing a compressor to determine the volume of air compressed and delivered in a given time under specified conditions is important. A periodic test will show the overall efficiency of the unit and reduce the possibility of pressure loss at some inconvenient time.

The A.S.M.E. power test codes for reciprocating, rotary and centrifugal compressors is endorsed by the Compressed Air and Gas Institute and gives complete testing instructions.

The general scheme of the test setup using a two-state displacement type compressor for example, is to first isolate the compressor from the regular service line. This is done to eliminate the possibility of leakage into, or out of the test system. The entire output of the machine is then throttled from the receiver to the low pressure nozzle tank for measurement. (Fig. 3)

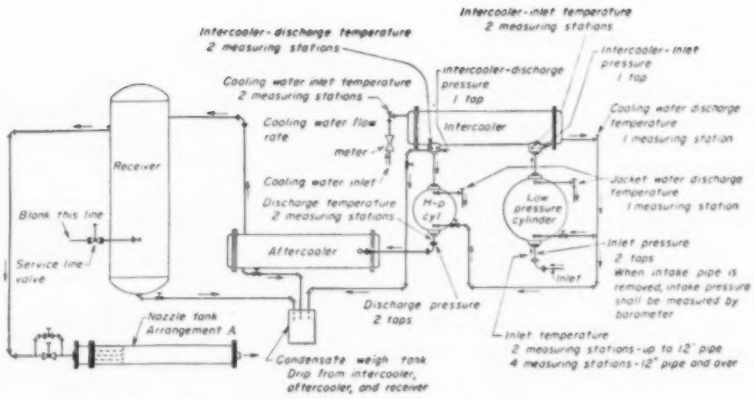


Fig. 3. Arrangement of nozzle tank and other essential apparatus for test of multi-stage compressor.

The unit is then operated at constant speed. Discharge pressure in the receiver is controlled by the rate of throttling the pressure into the nozzle tank. Actual delivery capacity of the compressor is calculated by a suitable formula and the discharge pressure should be adjusted to maintain certain compression ratio limits (refer to Table 1).

Testing is an important maintenance factor in that varying conditions of installation and operation affect the performance. Correction of performance characteristics results in maximum performance at reduced maintenance costs.

Centrifugal Compressors: Whether the compressor is motor-driven or steam-turbine driven, the make up of the machine necessitates certain maintenance considerations varying to a degree from those of other compressors.

Compressor casings should be examined frequently for corrosion, erosion, fouling and the condition of stationary parts. If the casing includes diaphragm cooling, special attention should be paid to leaks.

The rotor should also be examined frequently for evidence of corrosion, erosion or fouling. It is advisable to keep a record of the rotor's condition. This will help show the gradual degree of wear and deterioration over a period of time. All rotor clearances should be checked and recorded and an accurate record of balance kept.

Journal bearings should be examined for evidence of wear. Thrust bearings should be checked for axial position, couplings cleaned periodically and replaced if in a questionable condition.

Casings of steam turbine compressors should be lifted at intervals and examined for corrosion and fouling. Attention should be given to the nozzle ring, diaphragms, packing rings, reversing buckets and other stationary parts. On steam turbine units, all protective devices should be checked for operability at least once a month. Operation of the auxiliary

TABLE 1 — MAXIMUM ALLOWABLE VARIATION IN OPERATING CONDITIONS

VARIABLE	Deviation of test from value specified	Fluctuation from average during any test run
Intake pressure	2% of abs. press.	1%
Compression ratio*	1%	
Discharge pressure*		1%
Intake temperature		1F
Temperature difference, low pressure intake and exit air or gas from intercooler	15 F	
Speed	3%	1%
Cooling water inlet temperature		2F
Cooling water flow rate		2%
Nozzle temperature		3F
Nozzle differential pressure		2%
Voltage	5%	2%
Frequency	3%	1%
Power factor	1%	1%
Belt slip	3%	None

*Discharge pressure shall be adjusted to maintain the compression ratio within the limits stated.

Compressor lubrication data . . .

LUBRICATION: is one of the most important maintenance factors affecting the operation of air compressing equipment. Manufacturers of compressors specify certain fundamental characteristics of the lubricant for each class of service, such as the viscosity at various temperatures, the flash point, the pour point, etc. For proper maintenance, most compressors require at least **three types of oil.** One for the **cylinder,** another for the **crankcase and bearings,** and the third for the **power cylinders.**

For single-acting, trunk piston type compressors, the oil must be suitable for both cylinder and crankcase lubrication and must be of the type known as "compressor-cylinder oil."

For compressors of the double-acting type, only compressor cylinder oil should be used for cylinder lubrication, but crankcase oil may be used for the running gear.

For steam-engine-driven-compressors, oil for steam cylinders should be of the so-called "steam-cylinder type." It is also important to specify to the oil vendor the exact operation conditions under which the steam engine is to perform.

Actually, there are seven important factors to be taken into consideration in lubricating a steam-engine compressor. (1) Initial steam pressure. (2) Quality of steam or percentage of moisture in the steam. (3) Degrees of superheat. (4) Exhaust pressure and temperature of high-pressure and low-pressure cylinders. (5) Type of exhaust, either condensing or noncondensing. (6) Use made of exhaust steam and (7) Type of lubrication system used.

If the oil vendor is familiar with these factors, proper lubrication resulting in the reduction of future maintenance costs can be obtained and the possibility of breakdowns greatly eliminated.

Compressor-cylinder Lubrication: The type of oil best suited for compressor-cylinder lubrication depends upon seven factors which are also highly responsible for reducing future maintenance costs. (1) Kind of gas compressed. (2) Ratio of initial and final pressures developed within the cylinders under normal operations. (3) Maximum temperature prevailing in the cylinders. (4) Number of stages of compression. (5) Type of cylinder cooling system. (6) Type of lubrication system used. (7) Approximate size and speed of the compressor.

The utmost care must be exercised at all times in lubricating compressor cylinders, and oils with viscosities on the high side are preferable for compressor cylinders working under high temperature conditions, such as single-stage machines, compressing to seven or more compressions.

oil pump should also be checked and, occasionally, the unit should be overspeeded and tripped.

If an electric motor is involved, clean the air ducts and windings often, check the condition of the insulation and the air gap.

Proper compressor maintenance, regardless of type or working conditions, presents little or no problem compared to the loss of time and increased operating cost if the unit is neglected.

If an aftercooler is not employed, some of the trouble experienced with water in air lines can be overcome if small air receivers are installed in the lines at frequent intervals. These receivers act as collecting tanks. Suitable piping must be provided to permit draining these vessels regularly and all air hose connections should be made at the top of the distributing lines to avoid picking up moisture.

Water Supply: For effective performance, a liberal supply of cold, clear water is necessary at all times. However, if the water is too cold, condensation may form in the air inlet passage of the high pressure cylinder as the air enters from the intercooler, because the air may be much warmer than the water. If condensation forms, it will be carried into the air cylinder and will destroy the lubricant, causing rapid cylinder and valve wear. To relieve this condition, it is advisable to pass water which is exceptionally cold, through the intercooler first. Another safety measure is to reduce the water supply to the cylinder jackets so that the temperature of the discharge from it will be between 100 and 115 F.

Caution should be taken to open all jacket and cooler drains in freezing weather when shutting down the compressor.

Outlet water should flow into open funnels, allowing frequent temperature readings to be made. If it is necessary to use closed funnels, sight flow indicators should be put on the water discharge from cylinders and intercooler to show positively that water is circulating, and the discharge pipe should be bypassed to an open funnel so that the cylinders and coolers can be tested frequently to detect leaks in the water jacket or in the intercooler tubes. If the water discharge is opened to the overflow funnel and the valve on the discharge line shut off, any leakage between the air and the water spaces will be revealed by air blowing out with the water.

Steam Piping: Steam piping should drain toward the compressor to avoid low spots or pockets where water can accumulate and be carried into the steam cylinder to cause serious damage. A drain should be provided in the steam pipe on the boiler side of the compressor and as close to the compressor as possible. Live steam pipes should be properly insulated. The use of a steam separator and trap is recommended. Their use increases safety and economy since they supply drier steam.

For convenience in repair work, repacking, or regrinding the throttle valve, it is helpful to place a stop valve at the point where the steam pipe branches from the main line. This valve may also be used to stop the compressor in case the regular throttle valve becomes inoperative.

Exhaust Piping: Exhaust piping should be laid beneath the floor to

(*Continued on Page* 79)

Wetter Water Solves Problem for Danville, Virginia

Plant Stops Dust — $150 a Year

By BERKELEY ADKINS, Superintendent

Brantly Steam Generating Station
City of Danville Electric Dept., Danville, Va.

PLANTS USING COAL must contend with the annoying and generally costly problem of dust. The best way to fight it is to stop it before it can start.

This is the approach we have used for more than a year now, and it certainly has paid dividends in many respects. It is surprising, when we take stock of the situation, to find out how many real benefits there are in an effective dust control system. Some are obvious, some are hidden.

You can eliminate the hazard of dust explosions. You can safeguard the health and safety of employees, and in a dust-free atmosphere, you will see their morale and efficiency rise. Adequate control can also remove the danger of equipment failure caused by the abrasive wear of coal dust. With dust subdued, less cleaning is required. Then too, you are much more apt to be better liked by your neighbors if you don't let your dust get out of hand.

These are not just projected benefits. We have experienced every one of them, and at a cost of slightly more than one cent per ton of coal processed. Since we handle approximately 14,500 tons of coal a year, our treating material cost only $150 last year.

Our dust control system was engineered and designed by The Johnson-March Corporation, Philadelphia, and installed in January 1955. Our total investment for the equipment and layout came to $3,000. From the very beginning, the system has proved highly effective.

Our Brantly plant, completed in 1949, is owned and operated by the City of Danville, and supplies electric power for the community and surrounding rural area. It has a capacity of 30,000 kilowatts per hour, but at the present time it is generating only 20,000 kilowatts per hour. The plant is designed to operate on either gas, oil or coal. It uses gas on an interruptible basis. When the rest of the city is using little gas, we use enough gas to come up to the minimum amount

Exterior and interior views of the City of Danville Electric Department's Brantly Steam Generating Station. Note the clean interior of the plant where there is no trace of dust in the air or on the equipment.

of natural gas allotted to the community. When gas consumption is high in the city, we use either oil or coal.

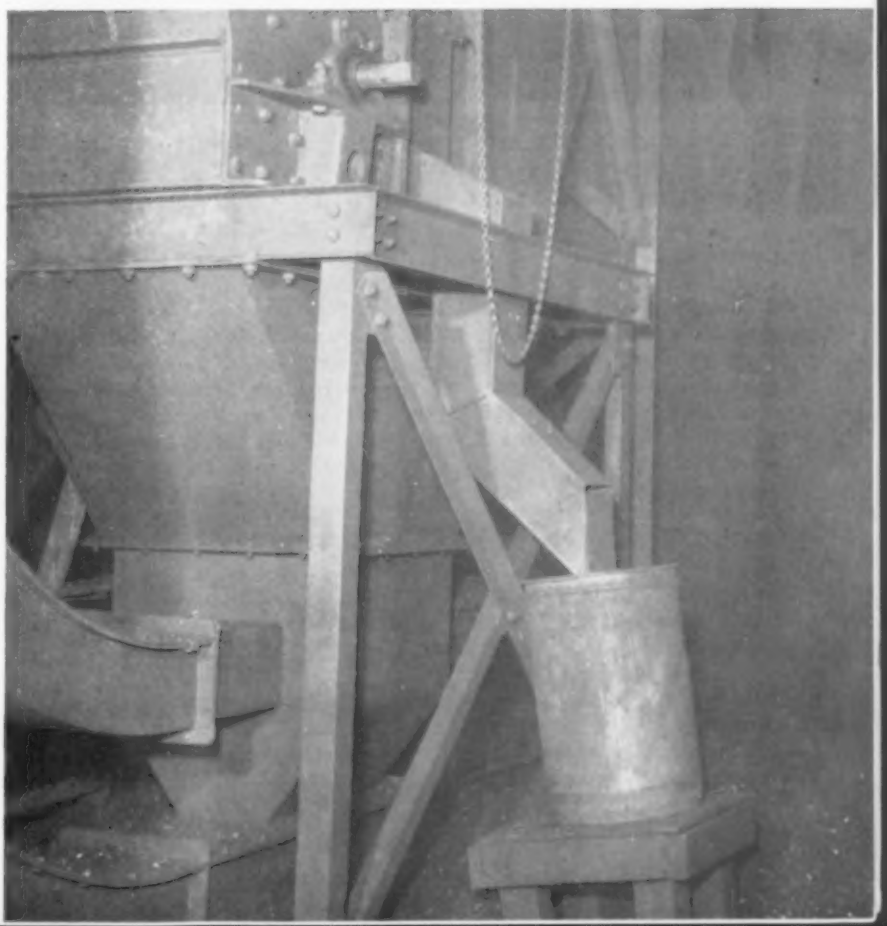
Coal Handling Problem

We receive 15,000 tons of coal annually by rail car. We dump it onto a conveyor; magnetically screen out metal, slate and slag which would damage pulverizing equipment; and crush the coal to the powdered consistency of flour. Then we blow this granuled coal into our fireboxes to create steam and generate power. We do all of this without the dust which normally accompanies such coal handling operations.

How to control dust was given some consideration in the original design of the plant, but we did not actually install our present system until the increased demand for power magnified the dust problem. We studied the matter and the possible solutions at great length before we decided on our present system. For a period of nearly two years, we conferred with mine and plant authorities having similar difficulties with coal dust.

How System Works

The Johnson-March system holds down dust by "wetting" the coal at those points in the handling operation where dust is troublesome. Used in the wetting process is a specially formulated wetting agent or liquid diffusion compound



With the Johnson-March system operating (upper view), the pulverizing equipment area is clear and dust-free. This is the point in the operation where the problem of dust had been most serious. The spray headers, which blanket the pulverized coal with wetting compound, are inside the equipment and cannot be seen.

Lower view shows the same equipment area five minutes after the dust control system was turned off. The system was shut off in a graphic demonstration to show what the atmosphere would look like without engineered dust control.

Dust is smothered by wetting material before it can rise at the base of the hopper as the coal falls into the conveyor belt.

known as Compound MR. This is a highly concentrated chemical solution which is added in small amounts and instantly dissolved in ordinary water. It is non-toxic, non-corrosive, odorless and harmless to skin and clothing. The amount of moisture added is very small. Consequently there is no effect on performance of equipment.

Action of the wetting compound on the coal dust is quick and effective. Unlike plain water, which tends to roll off a dry surface or form globules, water treated with Compound MR loses its surface tension. This lets the water spread further, penetrate deeper and diffuse more widely than it would ordinarily. Water treated in this manner actually keeps working into the coal until it has exhausted itself.

A proportioning unit measures the amount of compound that is metered into the system's piping system. The resulting solution is then applied by spraying through strategically located nozzles. This spray pattern, at the right locations, encloses the dust producing area and stops the dust at its source. The entire dust control system works automatically, so that the sprays go on at the proper time and place.

Stopping The Dust

We start our dust control at the very first phase of the station's coal - to - electricity transformation . . . the point where the coal is dumped from railroad gondolas through a screening grid onto an enclosed belt conveyor. This occurs on a spur track adjoining the steam plant. The coal gondolas are halted over a wide mesh grating, hasps are released from the gravity chute beneath each car, and coal falls through the grid onto the belt. Throughout the remainder of the coal handling system, the coal is moved on conveyor equipment manufactured by Stephens Adamson Manufacturing Company, Aurora, Ill.

The coal is sped by this conveyor belt through a hopper where magnets trap out any metallic elements which could damage the pulverizer. As it passes through the hopper, the dusty coal is sprayer with Compound MR from a battery of spray headers mounted along the interior walls. This spray pattern thoroughly "wets" the coal, smothering the dust before it can rise.

Now treated with the wetting compound, the coal is carried on by conveyor to two intermediate storage silos on the plant roof. Automatically operated gates in the silos release the coal at the right moment, dropping it into pulverizing equipment which crushes and grinds the coal to a fine powder.

It is here, at the pulverizing or crushing operation, that the dust problem was most severe. Spray headers again wet down the powdered coal with Compound MR, keeping the equipment area clear of dust. The amount of water added is less than one per cent and does not impair operation of the pulverizers.

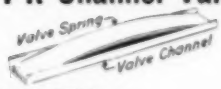
Just to see how effective our control system is at this point, we occasionally turn it off for demonstration purposes. Usually in less than five minutes, the area becomes thick with finely-powdered, cough-provoking coal dust that almost obscures the equipment. With the atmosphere so saturated with dust, our electric lights appear red instead of white.

Next, passing into a blower, the damp and dustless powdered coal is blown at high pressure into the fire-boxes of the boilers. Since only 1/4 to 1/3 of a gallon of water per ton is used, there is no effect on blowers or burners. The coal

A SPACE-SAVING, READY-TO-GO

125 hp TWO-STAGE AIR-COOLED MOTORCOMPRESSOR

- Easy to install
- No water jackets or piping
- No freezing problem
- Air cooled intercooler
- Constant speed or dual control
- I-R Channel Valves

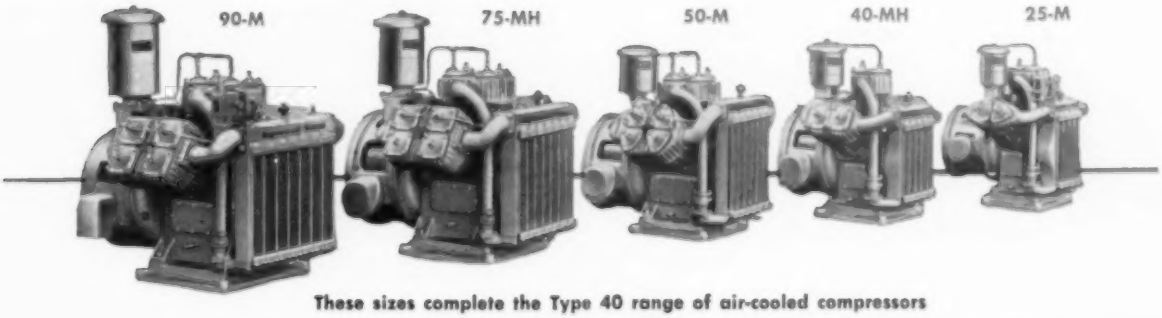


High Efficiency
Quiet Operating
Exceptional Durability
Entirely Different
Stainless-steel Channels and Springs
Air-cushioned action
Found only on I-R compressors

Newest addition to the Ingersoll-Rand line of Type 40 compressors, this heavy-duty, air-cooled unit offers new convenience and economy for the generation of 80-125 psi air power in the 125 hp class. Shipped fully assembled, its compact, well-balanced design and small foundation requirements cut installation costs. And efficient two-stage compression with intercooling to near ambient temperature, reduces power costs all year around.

Choice of constant-speed control, automatic start-and-stop control and manual or automatic dual control affords the most efficient capacity regulation for your particular operating requirements.

For complete information on all the time-saving, cost-saving features of this 125-hp Motorcompressor, send today for your copy of Bulletin 3188.



These sizes complete the Type 40 range of air-cooled compressors

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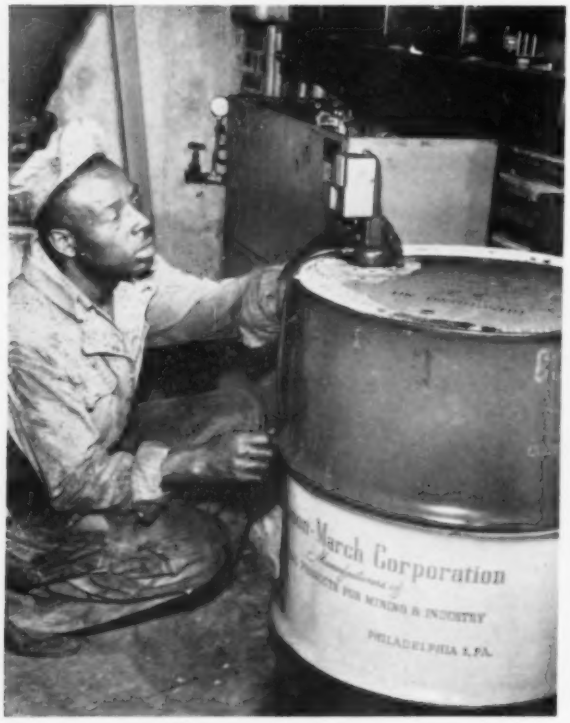
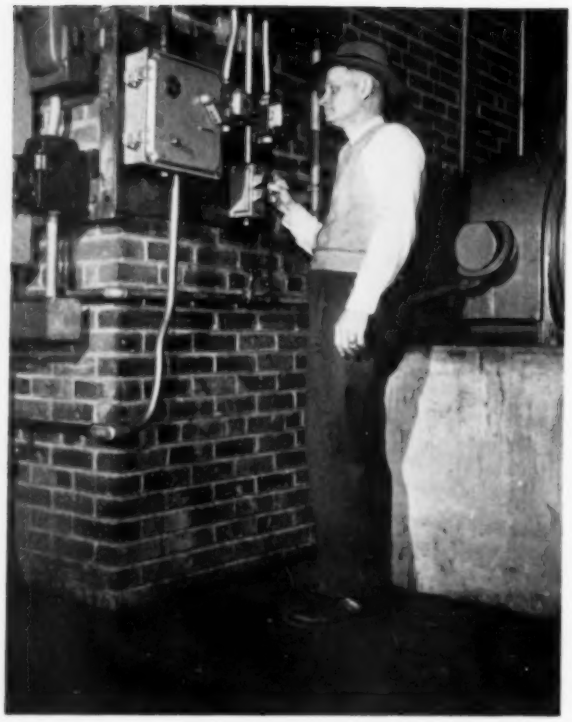


A worker making a routine check of the tank of Compound MR and the proportioning equipment.



James B. Gardner, chief operator of the station, checks the automatic controls of the system.

ignites instantly, and the production of steam for driving the plant's turbines is begun.

In addition to the compound's wetting action, it also has important and lasting after-benefits. When the intermediate storage silos are filled to capacity, additional coal crushed by the equipment and treated with the wetting compound, is carried by a mobile chute to an outdoor coal storage pile adjacent to the plant. Formerly, the slightest breeze would pick up the untreated coal dust and deposit it all over the area in black streaks and spirals. Now, however, the liquid-treated coal remains undisturbed in the face of even strong breezes. This result is accomplished by the sticking of dust to larger particles.

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Automatic operation of the entire dust control system saves time and expense and also permits a high degree of efficiency. Little maintenance is required to keep the system in top operating condition. All of the lines are flushed once a year. The mixing tank is constantly inspected, but this demands very little time. Actually, in a year, we invest no more than $130 in maintenance and operating time. One 55-gallon drum of the Compound MR, which costs $4.00 a gallon, lasts us about a year and a half at our mix rate. The compound has cost us only $19.25.

Clearly, we have gained a great deal from our dust control system at an unbelievably low cost. We no longer have to worry about the possibility of coal dust explosion. We enjoy the best possible employer-employee relations since ill health and loss of time due to dust is at an all-time low.

No longer must we contend with the threat of dust damaging exposed high-speed bearings and commutators. We have done away with the danger of dust abrasion, wear and tear. And we have not had to spend the great amount of time cleaning our equipment that was necessary formerly when there was so much coal dust in the atmosphere.

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*Write for free reprint of case description.

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South Assumes Leading Role in Atomic Energy

By JOHN F. LEE
SPI Consultant on Atomics and Professor of Mechanical Engineering North Carolina State College Raleigh, North Carolina

THE SOUTH seized the initiative in promoting industrial leadership in atomic energy for this area early in 1956 when a conference under the auspices of the Southern Regional Education Board was held at Oak Ridge, Tennessee. The regional development of atomic industries was proposed to the Southern Governors' Conference by Governor LeRoy Collins of Florida. His proposal met with the unanimous approval of governors from sixteen Southern states. The Oak Ridge conference was held as a result of Governor Collins' proposal.

The Oak Ridge conference was attended by fifty-two industrial and educational experts from sixteen Southern states and by fifteen specialists on atomic energy gathered from all over the country. The Conference was charged with a consideration of the following objectives:

(1) The preparation by each state of a study covering the local potential for procuring nuclear materials, the practical industrial applications of nuclear energy, raw materials available for industrial use, the market development possibilities, and an inventory of the available labor force. The public agencies, universities and private research institutions in each state would be used in making this study.

(2) The establishment of a regional clearing house for the exchange of information available in the separate studies prepared by the states to disseminate this information to industries in each state as well as appropriate agencies of the Federal Government.

(3) The preparation of a long-range development program for the industrial economy of the South based on the information obtained from the studies.

(4) The promotion of a vigorous program of attracting nuclear energy installations to the South.

(5) The provision of technical assistance for investors who lack the facilities for the comprehensive research and planning necessary for compliance with Federal requirements in the development, design, construction, and operation of nuclear power plants.

The findings of the Oak Ridge Conference were not made public but will be presented in the form of specific recommendations which will be presented at the annual meeting of the Southern Governors Conference this fall.

Export Reactor

The first export nuclear reactor for use in South America will be manufactured by Babcock & Wilcox Company. The Brazilian equivalent of our Atomic Energy Commission has ordered a "swimming pool" type reactor for research at the University of Sao Paulo.

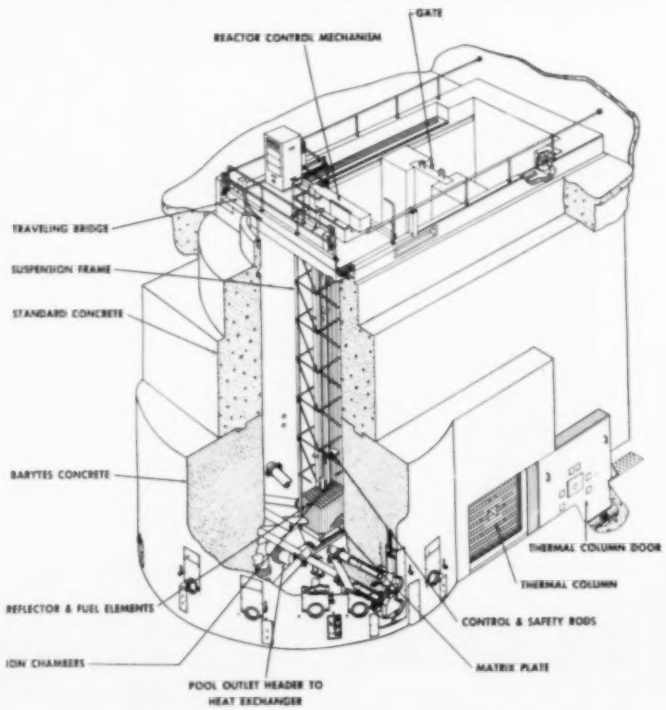
The reactor (illustrated), will have a power level of 5,000 kw. Fuel will be furnished by the United States Atomic Energy Commission under one of the 25 bilateral agreements, entered into between the United States and friendly governments.

Fuel Elements

The fuel elements for the reactor will be manufactured at the Lynchburg, Virginia nuclear fuel fabrication plant of the Babcock & Wilcox Company. The fuel elements will be enriched with 20 per cent Uranium-235. The reactor will be useful in conducting experiments in the fields of biology, medicine, physics and chemistry. Such studies as those connected with the irradiation of foods and drugs and the design of future nuclear power reactors

(*Continued on Page* 78)

Fuel elements for this swimming pool reactor will be manufactured at the new Babcock & Wilcox Company's Lynchburg, Virginia plant.



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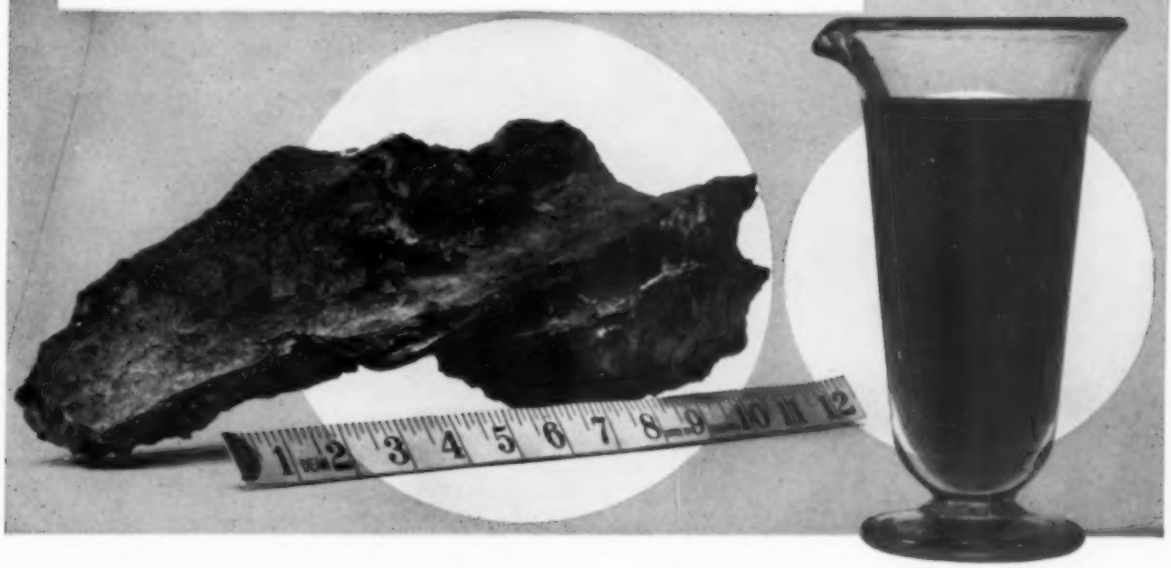

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What Management Expects of THE GENERAL ENGINEER

By Herman Granberry*

Head, Mechanical Department
Research Division
West Point Manufacturing Company
Shawmut, Alabama

MANAGEMENT generally expects the engineer to give facts from which it can make decisions. The engineer is expected to find the facts, analyze them and present them in a clear and objective manner and, often, to make recommendations as to the course of action. In general, however, an engineer's job is to solve problems, and management makes final decisions. They have much in common.

For this and other reasons, an increasing number of engineers have been brought into management in recent years, and in the future, even more engineers will be brought into top management. This is natural because the engineers' background and training are so well suited to managing—i.e., the art of making decisions.

The general plant engineer is properly a part of management. He may be known as the "plant engineer," or just the "engineer," and is usually charged with the maintenance, repair, and sometimes design and construction of plant and equipment.

The Two Sides

There are some who feel that an engineer is through with a problem when he solves the technical part of it. This is not the case. In the broad sense, all problems involve both *people* and *things*. This is true in solving the problem as well as in putting the answer into practice.

*Abstracted from a paper presented at Conference on Electrical Application for the Textile Industry, Georgia Institute of Technology — March, 1956.

Thus engineering work, as is true with all "work," deals with two factors — the technical, and the human. The technical factor is one with which all engineers are acquainted and are quick to acknowledge. The human factor is one which more and more engineers are recognizing as a real part of their job.

In simple language the distinction is made here between "things" and "people." The engineer's job concerns these two factors and, for that matter, so does management's job. The engineer's job is very much like a coin with two sides, but who can say where one side stops and the other begins?

The accompanying graph illustrates the principle that a part of every person's work is concerned with *people* and another part is concerned with *things*. Needless to say, there is much overlapping and no clear-cut line of demarcation. It can probably be agreed that some jobs are more concerned with things than with people, and other jobs are more concerned with people than with things.

For example, it may be agreed that brick-laying requires more skill in laying bricks than in understanding and handling people. Likewise, it might be admitted that a minister, or statesman is primarily concerned with understanding and working with people and to a much lesser extent, with things.

It must be understood that since a job will vary from time to time, and from organization to organization, the "ordinates" of the "curve" are rather flexible and, perhaps, sometimes ambiguous, but their general order is of importance.

Notice that the engineer and manager are in the middle or upper portion of this curve. This merely indicates that an engineer (or a manager) has a job that requires more ability to work with or to handle people than is required on a job such as that of machine operator, weaver, or a spinning hand.

Another observation we might make is the fact that most people seem to measure success by their position on the curve. The higher up the curve a man rises, the greater his feeling of success.

From this curve it would seem that in the fields of engineering and management the human factor is more important to success than the technical factor.

There are many reports indicating that lack of success or failure of graduate engineers is largely due to their failure in the field of human relations, not to their failure in the technical field. The higher the job level, the more true this is, because one of our most scarce commodities is the engineer or the manager who is able to manage and work effectively with people.

In the field of human relations it is the *personality* and *character* of a person that is of importance, while in the technical field it is his *technical training* and *technical experience* that are important.

Engineer's Training

Training and experience are the two gateways to all knowledge. These two gateways to technical knowledge have long been recognized and graduate engineers usually have ample *technical* training.

Training and experience can also be used to gain more knowledge concerning human relations, but these gateways to the most important part of an engineer's work have long been neglected. Evidently a graduate engineer is expected to have been born with all neces-

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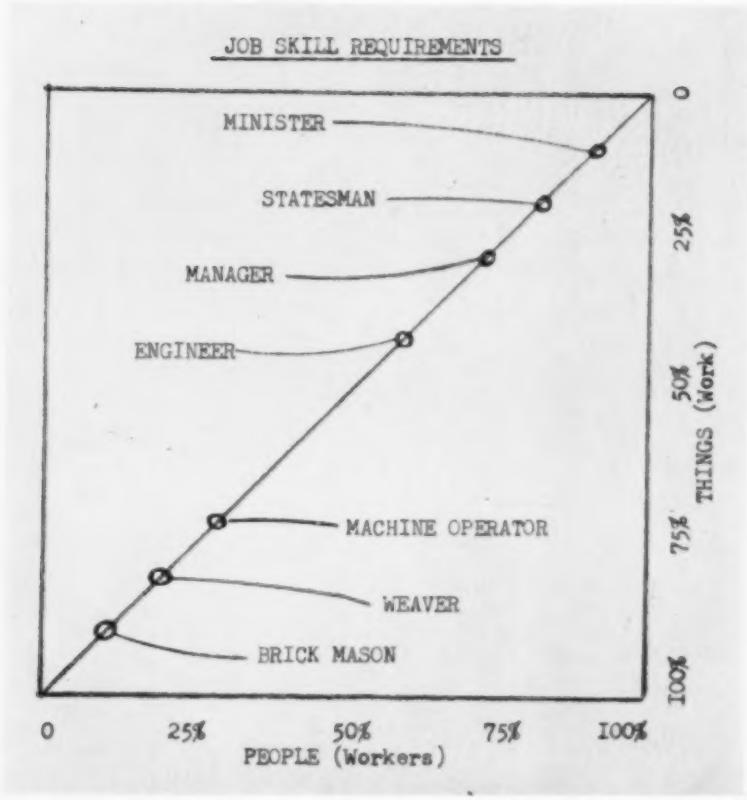

Part of every person's work is concerned with things and another part with people.

sary knowledge in human affairs or is expected to pick up this knowledge "on his own." Very few technical schools devote enough time or effort to training students in human relations.

Our technical colleges and universities have largely concentrated on the technical training of the engineer. However, modern educators are realizing that engineers and other technical and scientific personnel must also be equipped and trained to work with people. As a result, more emphasis is being given to seeing that the engineering student also receives training in basic psychology, philosophy, and other subjects formerly taught only to arts and science students.

There is a school of thought that all engineers should first be subjected to a four-years' training in liberal arts before they receive their technical education. This would mean eight years of college and is, of course, not the answer. It is agreed that the present four-year engineering course is a full one, but in view of the problem illustrated, it seems that perhaps some technical courses might be dropped or condensed in order to make room for some of the equally important courses in human relations. The five-year curriculum should, if adopted, provide for such courses in "human engineering."

However, the simple truth is that modern, concise, basic courses on how to get along with people are not being taught. Perhaps this is because these basic laws of human relations are not yet written into text books, or are not as fully understood as are most laws of mechanics and physics. It is a well-known and easily illustrated fact that our technical progress has far outdistanced our study of man himself.

This, then, is perhaps the greatest and most urgent need of our engineering curriculum today—to teach the engineer *more about people* as he learns about things. President Griswold of Yale University has said concerning the shortage of engineers: "yet the most urgent part of this urgent demand is for engineers who can cope with human problems."

This is a real challenge to our engineering colleges and it is one which some of them have already taken steps to correct, and others will in time, no doubt, meet this challenge.

It must be remembered that a man's education should not stop when he gets his degree. His education should give him some *basic facts*, the *desire to learn*, and knowledge of *how to learn*. This applies equally to the *human* field and to the *technical* field. Thus, it is not necessary for an engineer to learn all in college. His education in both the technical and human fields should continue throughout life itself.

It is not essential for one to have an engineering education in order to be an engineer. Many of our present engineers or master mechanics are self-trained and yet they are more of an engineer than many that are being trained in our schools today will ever be. However, as industry becomes more mechanized, the master mechanic or engineer finds himself even more handicapped if he does not have sound engineering training.

Management recognizes the need for, and use of, trained men because they are using more and more of them as they become available. In fact, the demand now surpasses the supply and we are in the midst of a shortage of engineers.

In summarizing the engineers' educational problem we can, perhaps, agree that the engineering training given by our technical schools today leaves much to be desired in the most important area of an engineer's work — that of understanding and handling people.

What Management Expects

The foregoing discussion has been given in order to roughly define the engineer's job and his training needs. These needs are, of course, reflected in what management expects of the engineer. The qualities that management looks for can be divided into two

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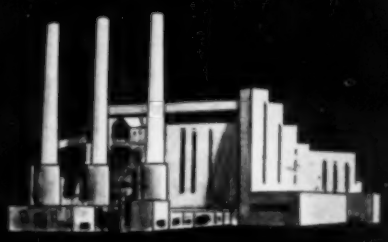

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classes corresponding to the two sides of the coin — personal character traits (human) and technical ability (technical).

Character Traits

These are the traits that seem to affect most often one's dealings with, or relations with, other people. These are generally those most important items which are not taught in technical schools.

INTEGRITY:

It has well been said that integrity is the one most important characteristic of an engineer or manager, and it is the one trait that the man must bring to the job. He can be taught many things on the job, but integrity of character must be supplied by the man.

Integrity is difficult to define but the lack of integrity is easily recognized. Integrity is a moral property and has to do with honesty, sincerity, loyalty, and decency.

It must be remembered that the *average* man is endowed with *average* integrity and is not to be considered dishonest and unscrupulous. The requirements for an engineer or a manager are *above* the average in regard to integrity.

The average man has a price and will sell out or compromise whenever it becomes moderately uncomfortable to live up to his obligations. This is not what is meant by "integrity."

It is most interesting that engineers are so transparent in regard to integrity. Work with an engineer for a few days or weeks and you know how to rate him as to integrity. Integrity is one trait that is essential to good engineers and good managers alike.

An engineer must guard his integrity as his most valuable personal asset. He should be fair, honest and loyal to those working with him, to those working under him, and to his superiors.

ABILITY TO DO THINGS:

It is a simple fact that management expects an engineer to *want to work*. This demands energy and aggressiveness. There is plenty of demand for engineers that are ready and willing to work, and who can bring an aggressive and ingenious approach to the job.

An engineer will make mistakes but he should profit by them and should not repeat his mistakes. The test of a good engineer is not that he doesn't make mistakes, but rather, that he can work his way out of them or turn them into a profit.

It is all too often that an excellent start is spoiled by a poor finish. Some engineers seem to get bored and lose interest as soon as some of their first ideas don't work out as planned. A good engineer must follow through.

A creative imagination is invaluable in solving problems. More truly creative thinkers are needed, particularly in the fields of engineering and management.

Clear and objective thinking is a must for an engineer. Accuracy is the first requirement; speed will come with experience. Management has the right to, and does, expect the engineer to keep his feet on the ground and make clear-cut analyses of problems.

An engineer's job is to solve problems but he must also make necessary decisions. He should know when to make a decision and when to refer the question to a higher authority. He should know his limitations and know when to call in an expert to help him.

After a problem is solved or a decision made, clear and clean-cut reports should be made. A muddled report leads one to doubt that the problem has been properly solved.

LEADERSHIP:

A certain amount of leadership is desirable in all engineering jobs. Some engineers are looked to for more leadership than are others.

If an engineer is to solve problems and make decisions, he must have management's confidence in his results. This is a form of leadership.

Leadership is difficult to define but leaders are aggressive, courageous, and inspire others. *Performance* should be the goal, not conformance.

All good leaders enjoy the loyalty and confidence of their followers; this is merited because the leader has first given his loyalty and confidence to his followers. A good leader is still a good follower.

ABILITY TO MANAGE:

The ability to manage work and workers is highly desirable in an engineer. The engineer is trained to manage *things* but people are another problem. All engineers should learn as much as possible about good management.

APPEARANCE AND ATTITUDE:

We enjoy working with or for a person who is *neat* and *clean* and who has a positive and happy attitude regarding things in general.

If we like people they will like us, if we resist people they will resist us. It is in our power to build ourselves or to destroy ourselves. Our attitude toward others, to life itself, determines how we fare.

Technical Knowledge

The list of technical knowledge that management expects an engineer to bring to the job is large. We are all acquainted with such requirements and so understand what an engineer is expected to know.

Management expects the engineer to *understand* the basic laws of physics and mathematics. Few sights are more pathetic than that of an engineer who has learned all the formula but does not understand the basic laws and principles. Basic fundamentals are usually more important than advanced theory or highly specialized applications. These basic fundamentals are *building blocks*.

MATHEMATICAL ABILITY:

Mathematical skill is perhaps one of the most important abilities that an engineer has. In fact, engineering is based on physics and math. If an engineer has a good foundation in math and is able to use this math, he has made a big stride toward attaining his technical training.

ANALYTICAL ABILITY:

Very closely allied with mathematical ability is analytical ability.

Clear logical reasoning is a most valuable asset. The world is full of faulty reasoning and lack of ability to properly analyze our day to day problems.

A problem clearly defined (i.e., well analyzed) is a problem half solved. All too often we find engineers working on the wrong problem or the wrong phase of a problem. Management expects an engineer to be able to decide what is the true problem and how to attack it.

Analytical ability may be said to be the ability to literally take a problem apart. How much easier it is to solve a great problem by solving the smaller simpler parts one at a time than to attack the overall problem with a scattergun attack.

ABILITY TO COMMUNICATE:

If the most important thing for an engineer to be able to do is to solve problems, then perhaps the second most important thing is to be able to communicate his solution to others in such a form that they can take it and use it.

From time to time an engineer will make oral and written reports. He must know how to *write* and how to *speak*. This can be and is taught in college, but experience will be needed to develop this training.

Managment wants all engineering reports to be in a clear and understandable language. Most engineers seem to get a lot of satisfaction from using a great array of technical words and phrases. This is a decided disadvantage when reporting to non-engineers.

Written reports, whether they be simple memos or lengthy technical reports, should be so arranged to give all of the important facts in the first paragraph or on the first page.

As a rule, if a busy executive receives a ten-page engineering report he will not, and should not be expected to, read the report word for word. Best practice dictates that a summary of results or a synopsis of the report be given on

(*Continued on Page* 81)

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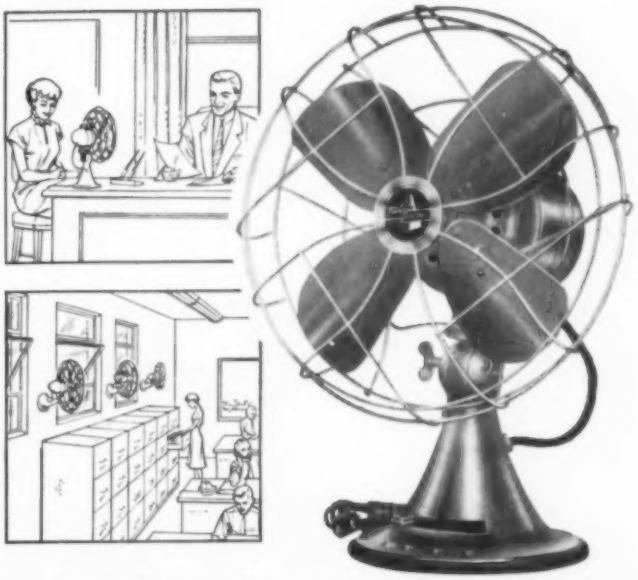

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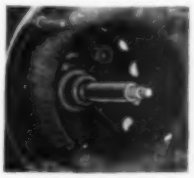

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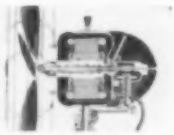

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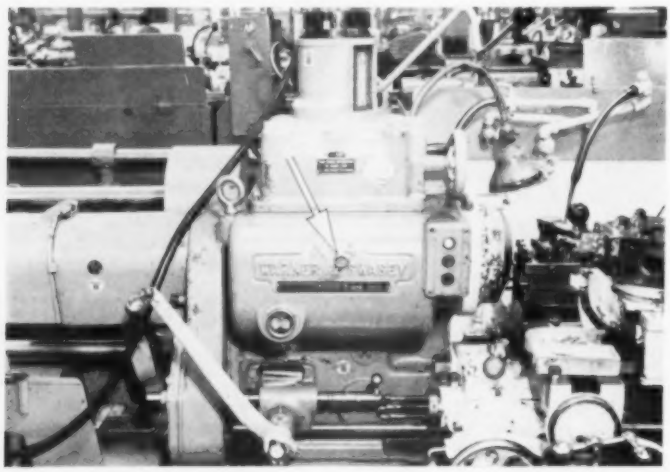
To permit the escape of gases, the covers of Bourdon tube gauges should be provided with large vent openings sealed with paper or foil for dust protection. When possible the gauge glass should be removed and the face left open; or for dust protection, the glass should be replaced with thick, transparent sheeting or with safety glass so that the danger from flying particles will be avoided.

Bourdon gauges should be placed above eye level. In some laboratories, it is required that Bourdon gauges be placed behind a barrier and read only by their reflection in mirrors so that the observer is at all times out of the range of danger. The usual procedures should be followed, such as the use of oil seals to prevent corrosion, throttling down to prevent fatigue, and the use of built-in checks to prevent the pressure from rising too rapidly.

When a gas containing finely divided liquid or solid particles passes at high velocity over an insulated metallic object, that object becomes electrically charged. The charge may become sufficiently great to cause a spark, which in turn ignites the gas.

When metallic containers rupture, frictional effects may cause very high local temperatures and the ignition of flammable gases.

A pressure relief device that has met with favor because of its simplicity and because it cannot readily be prevented from blowing off when the pressure exceeds a predetermined value of the disk consists of a special plate held in place by flanges. When the pressure rises too high, the disk ruptures. The disadvantages of the method are that the contents may so weaken the disk that, unless frequently inspected and renewed, it may burst at too low a pressure; on the other hand, since the working pressure produces stresses close to the yield



Turret Lathe Repair Technique

REPLACING the pre-selector head on Warner-Swasey turret lathes after maintenance or overhaul work was formerly a tedious and time consuming job. The repairman had no way except trial and error to guide the shifter arms into position. Average time to replace the head was two man-hours.

This problem has been solved at Convair Division, General Dynamics Corporation, Fort Worth, Texas, by drilling and tapping a ¾" hole (plugged when not in use) in the front of the gear box directly in line with the correct shifter arm position. This provides both visual and mechanical access to the shifter arms during re-assembly. The arms are easily and quickly guided into position on the first attempt. Average time is .083 man-hours. This saves several hundred dollars a year in maintaining the 27 lathes of this type in the plant.

By F. C. CLAYTON, Chief Plant Engineer, Convair Division, Fort Worth, Texas

strength of the material of the disks, they tend to become strain-hardened with continued use and may then fail to relieve the pressure at the desired point.

Because of the relationship between yield strength and ultimate bursting strength, a rupture disk is generally designed to relieve at about 1.5 times the working pressure when the latter is steady or at 1.75 to 2.0 times for fluctuating or pulsating pressure. However, these ratios may vary appreciably depending on conditions. In one case at 1,000 atm the ratios were 1.30 to 1.40 respectively. For details on the calculations, characteristics, and uses of rupture disks, reference is made to the paper by Murphy, Chemical & Metallurgical Engineering — November, 1944, page 108; December, 1944, page 99.

Carbon monoxide rapidly attacks pure nickel within a limited temperature range, forming nickel carbonyl, and it even attacks iron, though much more slowly. Thus, when carbon monoxide is used, the proper selection of alloys is important. Care is also necessary to make sure that mercury in any apparatus does not come in contact with copper, brass, or other metals with which it can amalgamate.

The general belief that mercury cannot wet steel or form alloys with it is incorrect; Bridgeman found that mercury can wet surfaces made by breaking steel in mercury. This is of great importance where there is any possibility in a mercury container cracking slightly under pressure, allowing the mercury to wet the steel and

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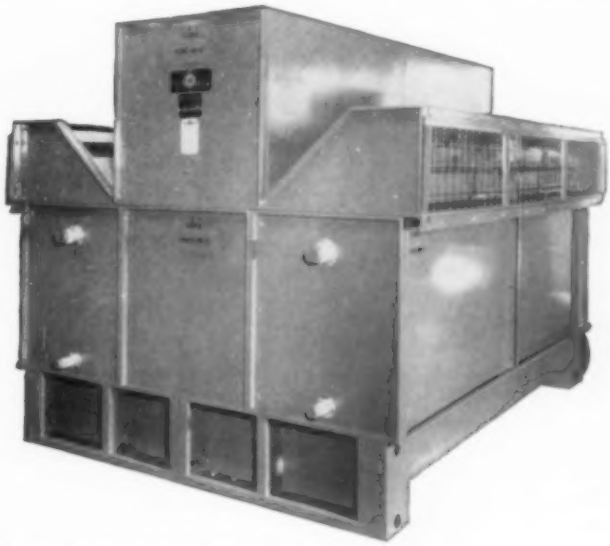

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start to undermine the walls. Above about 500 atm mercury will penetrate steel and eventually will cause rupture even without any cracks.

Oxygen must not be compressed or released in the presence of oil. Water is a readily available lubricant. Ivory soap suds are popular and the several compressed gas vending companies offer a silicone based lubricant. It has been found that when oxygen is admitted rapidly under high pressure into a space containing a bit of oily material, explosions may ensue. The explosion in the Bourdon tube mentioned above may have been of this nature. Pressure should always be built up slowly.

By Paul C. Ziemke, Oak Ridge, Tenn.

"BIGGEST VACUUM CLEANER IN THE WORLD" — With its cleaning nozzles in "working" position on the runway surface, the Hoffman "Jarc" rolls down a runway during a test demonstration for assembled Defense Department officials. As these cleaning nozzles roll along on the runway, they suck in air at a rate of 350 mph, picking up every bit of foreign material from wood to metal. Other types of runway cleaners use either brushes or magnets in removing materials, but are not able to thoroughly remove all harmful material because of the variance in the physical make-up of litter found around warm-up areas, runways and hanger aprons.

How to Save with Metallizing

MACHINE SHOP Foreman, Al Gerhardt, of the Alabama Drydock and Shipbuilding Company in Mobile, Alabama, with long experience in marine repair and building work, states that the metallizing process adopted by his company, has been one of its most revolutionary time and money savers.

Prior to installing metallizing equipment, many parts were scrapped and new ones made or purchased. Quite often electric or acetylene welding was used. In this case the choice of metals was limited and often shrinking or warping constituted a problem. One of the main reasons for turning to metal spraying was the attractive idea of build-up with almost cold metal. Seldom does a sprayed coating exceed 350 F which is not sufficient to affect the base material.

In addition to their value in work for customers, Metco guns, furnished by Metallizing Engineering Co., are used in the maintenance of the company's own equipment. This includes machinery for steel fabricating, sheet metal and lumber processing, electrical apparatus, foundry equipment, gantry cranes, locomotive and floating derricks. Also six big drydocks used for elevating all types of vessels to a dry position for underwater repair work. They say that "it stands to reason that the same savings of time experienced in production work should apply to their own maintenance jobs."

No Paint Splatter

"WE'RE READY to tackle any type of painting job," Stanley Hanks, president of Stanley Hanks Painting Co., Pinelawn, Missouri, said after a crew of his men recently completed spray painting a 550 ft radio tower at the edge of the busy St. Louis downtown business section.

Painting the tower of radio station KWK was not new to Mr. Hanks because his men worked on the project in 1949.

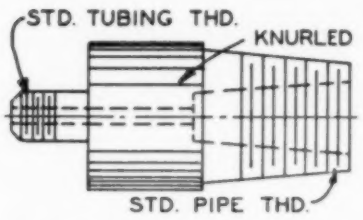
When the job again was offered to Mr. Hanks he hesitated to accept, recalling the headaches and expense of refinishing parked and passing automobiles which became spotted from the drippings and splatter off the painters' brushes.

After the distasteful experience in 1949, Mr. Hanks became aware that spraying was the only way to do the job. With the spray method, he explained that ultra-fast drying paints could be used. In the meantime, his men were being trained at The DeVilbiss Company spray painting school. They learned the correct techniques of handling spray guns so that overspray will be reduced to a minimum.

The combination of the paint and the training proved the answer to the tower problem. Although no parked cars were moved from the area or traffic diverted from the street, the results were conclusive, not a single damage claim was received.

Plastic Pipe Fitting Aids Instrument Tests

PLASTIC PIPE FITTINGS can save much labor and expense in the shop testing of all types of pneumatic instruments. How often the mechanic finds himself with an instrument to calibrate and no proper pipe or tube fitting to screw into the signal port of the instrument. This results in lost time in locating the proper fitting or leaks as a result of using a make-shift fitting.



Such difficulties can be minimized by the construction of a simple Teflon or other plastic pipe fitting as shown on the attached sketch. The plastic will give enough to allow for a tight fit even with a finger tight job. The tubing end can be made to fit the standard type of tubing fittings used in the plant. Several such fittings in the shop will save much lost time and speed up the repair job.

By N. V. AVARD—Delaware

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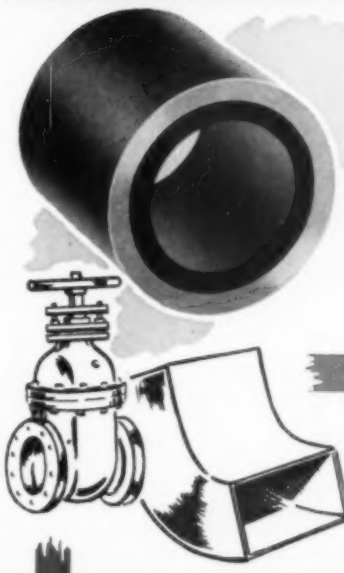

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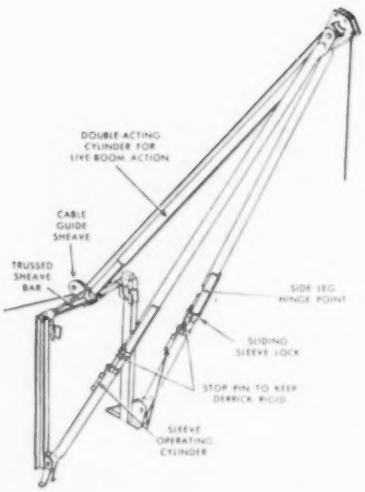
Rigid Derrick Converted Into Hydraulic Operation

G-1 A new field kit, available from the J. H. Holan Corporation, 4100 West 150th St., Cleveland 11, Ohio, makes it possible to quickly convert a rigid tripod derrick into a hydraulically-operated, live-boom unit.

The kit (5700-C) makes live-boom action possible even though the existing derrick has a single drum winch.

A derrick can be easily converted in the field by a mechanic. Side legs are cut and hinged, and the center leg is cut for installation of the Holan double-acting cylinder which provides live-boom action. The kit includes all hydraulic components and piping. The hydraulic control valve is conveniently located on the rear of the truck body panel.


DOUBLE-ACTING CYLINDER FOR LIVE BOOM ACTION
CABLE GUIDE SHEAVE
TRUSSED SHEAVE BAR
SIDE LEG HINGE POINT
SLIDING SLEEVE LOCK
STOP PIN TO KEEP DERRICK RIGID
SLEEVE OPERATING CYLINDER

Locking of the side legs for derrick operation can be done in two ways.

Holan pin-type locking keeps the side legs rigid by means of a set of pins for each side leg. There is an established sequence for insertion so that a pin can't be pulled out at the wrong time. Pins are arranged so that one locks in another.

The second type of side leg locking is provided by exclusive Holan hydraulic sleeve locks. After raising the derrick vertically, the operator merely pushes a hydraulic lever and sleeve locks slide up to lock the hinged sections in a rigid position. Pin stops make it impossible for the sleeve locks to become accidentally disengaged.

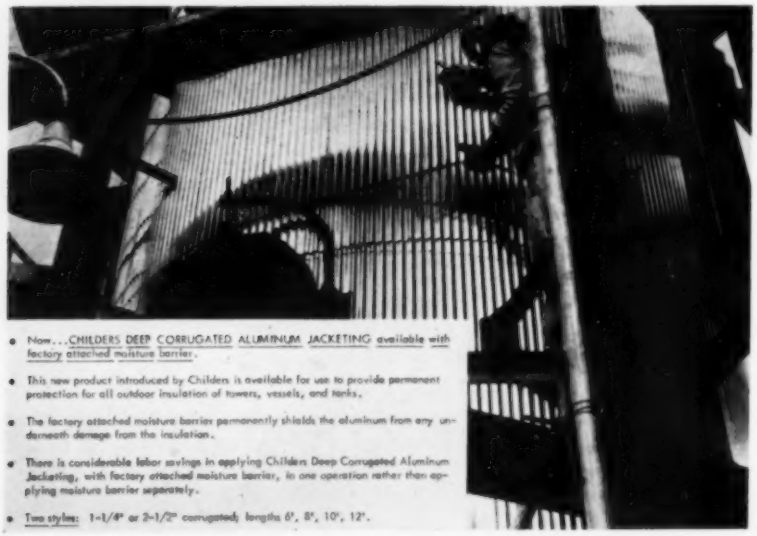
A relief valve in the hydraulic system provides built-in safety. Fixed flow restriction prevents rapid fall.

The 5700-C Conversion Kits are delivered with all needed parts and complete instructions.

Deep-Corrugated Aluminum Jacketing

G-2 A new deep-corrugated aluminum jacketing for tanks, towers and vessels has been introduced by **Childers Manufacturing Company**, 3620 West 11th St., Houston, Texas.

Childers introduced corrugated aluminum pipe jacketing eight years ago, which cuts jacketing costs up to one-third. The addition of deep corrugated jacketing for tanks, towers, and vessels, now make it possible to do an all-aluminum jacketing job on any installation. Appearance is improved, and installation costs are cut because of lower first cost and ease of cutting and handling. Childers aluminum jacketing may be attached with aluminum strapping and seals, or with aluminum sheet metal screws.


• Now...CHILDERS DEEP CORRUGATED ALUMINUM JACKETING available with factory attached moisture barrier.
• This new product introduced by Childers is available for use to provide permanent protection for all outdoor insulation of towers, vessels, and tanks.
• The factory attached moisture barrier permanently shields the aluminum from any underneath damage from the insulation.
• There is considerable labor savings in applying Childers Deep Corrugated Aluminum Jacketing, with factory attached moisture barrier, in one operation rather than applying moisture barrier separately.
• Two styles: 1-1/4" or 2-1/2" corrugated, lengths 6', 8', 10', 12'.

Deep corrugated jacketing is available with 1¼" or 2½" corrugations. Rigidity is increased by cross crimping the aluminum before adding the deep corrugations. Cross crimping adds up to 97% greater strength over plain corrugated aluminum.

A new factory-applied moisture barrier, added to Childers corrugated jacketing, has been developed to completely eliminate corrosion of the jacketing from within, providing a virtually permanent jacketing job. The jacketing with moisture barrier also eliminates a costly step in pipe and tank jacketing. The 15 lb felt wrapping, formerly used in most installations, is no longer necessary.

The moisture-barrier process used by Childers took more than three years to develop. Two years ago, a tough paper was found which would stand the more than 30,000 pounds of pressure in the corrugat-

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 17

ing press. It wasn't until last year that an adhesive was discovered that would hold the water resistant paper barrier to the sheet aluminum during processing.

Childers corrugated jacketing with moisture barrier is being used successfully in installations all over the country. Lower first cost and lower maintenance cost, plus the elimination of expensive pre-wrapping of pipe, is saving many industries thousands of dollars a year.

Cutting & Beveling Machine for Small Diameter Pipe

G-3 A completely portable flame cutting and pipe beveling machine for small-diameter pipe (1½" to 4") is being manufactured by **H & M Pipe Beveling Machine Company**, 311 E. 3rd St., Tulsa, Oklahoma. Wide application is predicted in industries where the fabrication and use of small-diameter piping is an important factor.

Heretofore, according to the manufacturer, hand cutting and beveling of pipe of less than 4" diameter has resulted in reduced operations and imperfect cuts and bevels, or had to be done by a pipe machine in a shop. The new H & M Model "O" is completely portable (weight: 7½ lb), and assures perfect, square bevels under all conditions. The machine can be operated easily and efficiently by unskilled operators.

Employing the same split-gear horseshoe principle which character-

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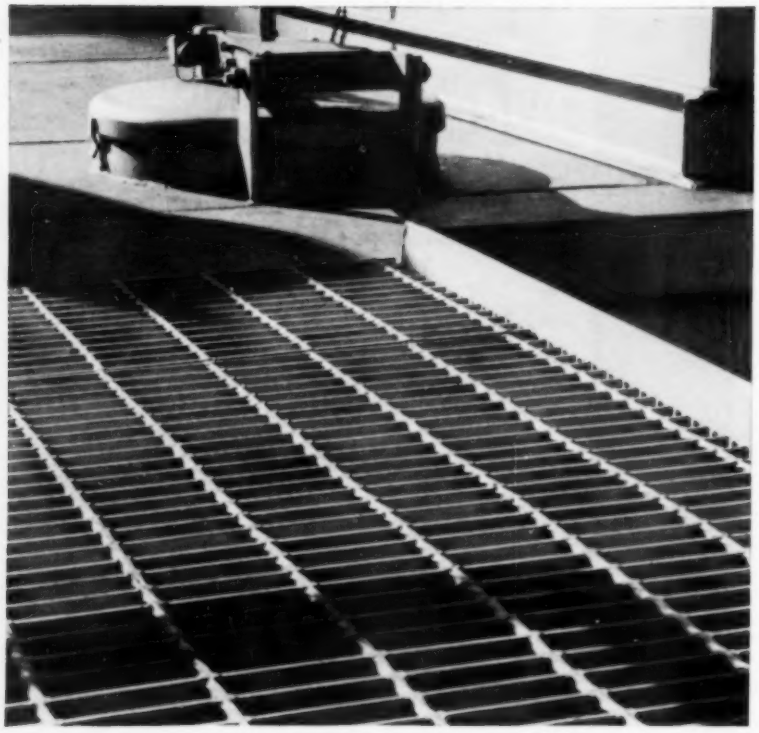

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   - serrated bars—for maximum safety under extremely hazardous skid conditions
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Equipment, Supplies & Methods (Cont'd)

izes the company's larger units (for pipe up to 36"), the new, smaller model allows its operator to place the machine on continuous pieces of pipe. A quick-operating, specially designed boomer strap speeds up the process of changing the machine from one piece of pipe to another.

On a recent field test at Yorktown, Texas, Gordon M. Barrett contracted the job of taking up, reconditioning and rebeveling a 20-mile pipeline, owned by Wescol Oil and Gas Company of Houston. In all, the line consisted of over 100,000 ft of 2" and 3" pipe, to be cut into 40' lengths. 2,700 joints had to be cut, with two bevels to each joint. Using only one of the Model "O" machines, Barrett completed 5,500 bevels in ten 9-hour days, using unskilled operators throughout the job. He reported as high as 660 cuts in one day by the single machine, and that all bevels were perfectly square. The machine was in perfect operating condition at the end of the ten-day job.

Changing the unit from one size of pipe to another is a matter merely of replacing precision-made adapters, properly identified for the various pipe sizes. The change from the smallest to the largest pipe size can be made in a matter of seconds. Any plain-barrel machine cutting torch may be used with the unit.

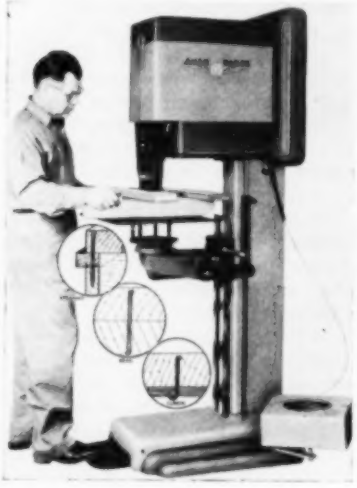
Power-Driven Nailer; Three Nails-a-Second

G-4 With the addition of its newest model, Hercules-9, the **Auto-Nailer Company**, 267 Marietta St., N.W., Atlanta 13, Ga., now has a range of 5 automatic, power-driven nailers ranging in utility from the nailing of the most delicate moulding, to nailing 2 by 4's and heavier stock. The nail sizes range from 20 gage to 13 and lengths from ¼" to 2¾". The work areas range from 9¾" to 35" height and from 2¾" to 15½" depth.

Auto-Nailers are given a numeral suffix which indicates the "penny" size of the maximum nail each machine can cut and drive. The nails are cut from a reel of special high-tensile strength wire of special steel, deeply knurled for increased holding

power. Because of this, an Auto-Nailer nail will do a job usually assigned to a much larger and longer common nail.

Auto-Nailers are approved under Amendment 1, Federal Specification PPP-B-601 for Government work.



The new Hercules-9 Auto-Nailer, featuring a maximum 2¾" nail, dispenses its wire from an expendable carton. Unit, cutting its own nails as it goes, will operate at speeds up to 3-nails-a-second.

Auto-Nailers will cut blunt, needle-point or headed nails; will clinch or brad the points, if desired, when total thickness of the work is within length limitations. Auto-Nailers will countersink the heads or can start nails for later hand driving. The work is "squeezed" under pressure, which is adjustable up to 1500 lb—depending on the model, affording tighter joints. Because of this pressure, Auto-Nailer is ideal for glue joints. Besides eliminating the slow, costly process of clamping, Auto-Nailer affords better glue distribution resulting in a positive glue bond.

Auto-Nailers have controls which permit quick changes in type of work, height of "anvil" table, length of nail, countersink or flush. These changes can all be made quickly and easily on convenient dials or cranks.

The Spartan-4, Trojan-5 and Hercules-9 are equipped with a close-to-edge nailing device which permits operator to drive the nail curved instead of straight when desired. Spartan-4 and Trojan-5 have an attachment which extends countersink beyond their standard 3/32" countersink.

Mercury-3, Spartan-4, Trojan-5 and Hercules-9 are equipped with standard electric motors, which may be quickly replaced in the field.

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Gentile Flow Tubes are short. They need only minimum straight runs entering and following, and can be installed at practically any accessible point where flow conditions are reasonably steady.

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Equipment, Supplies & Methods (Cont'd)

Industrial Applications For Marine Steam Generator

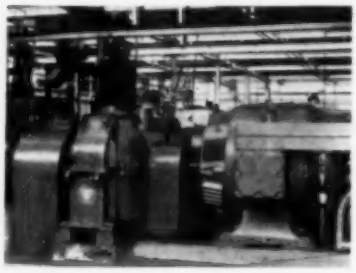
G-5 A dry land adaptation of their well-known Marine Steam Generator by **Cyclotherm**, Oswego 11, New York, makes it possible to obtain 5,000 lb/hr from an overall floor area 8' x 7'. Generator is only 7' high.

Boiler, completely reliable and efficient under severe variations in operating conditions, is completely electronically controlled.

Oil pump set assembly is furnished factory-installed under the unit to save space and cut down installation cost. Water treatment tanks are mounted on the side of the boiler shell and piped to feedwater pump system. By-pass piping permits manually controlled water circulation.

Heavy Duty Motors

G-6 **Brook Motor Corp.**, 3553 West Peterson Avenue, Chicago 45, Ill., has announced that large a-c electric motors up to 600 hp are being stocked at its warehouses in principal cities. Motors of 500 and 600 hp are available in drip proof and fan cooled types; depending on size, in either squirrel cage or slip ring.



The new Brook 600 hp, a-c motor

These large, heavy duty motors have found such ready acceptance that Brook now stocks them in many of their 14 warehouses. Being conservatively rated, they are cool and quiet running and feature ease of installation such as extra large conduit boxes as well as ready accessibility for lubrication and maintenance.

Control Valves

G-7 Designed to handle all fluids at unlimited pressures, two new control valves — the diaphragm-actuated Type CV-D and the piston-actuated Type CV-P — are now being offered by **Copes-Vulcan Division** of the Blaw-Knox Company, Erie, Pa.

The CV-D Valve has a wider range of application than older - styled Copes diaphragm - actuated valves. The CV-D Valve may be direct or reverse in action.

Simple in design and easy to maintain, the CV-P Valve also has extreme rangeability. The CV-P Valve has ideal operating characteristics and its piston actuation develops high force to deal with static and dynamic unbalances and with stuffing box friction.

Both valves will handle water, steam, air, gas, oil or other similar fluids at unlimited pressures. Each valve opening provides the correct flow at all times.

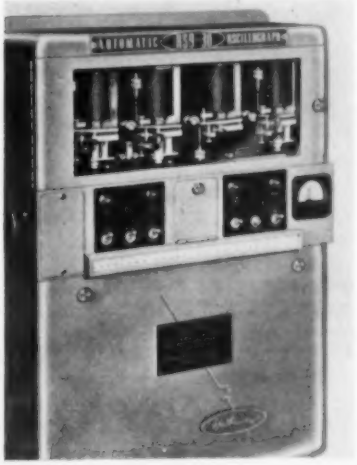
For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 17

Automatic Oscillograph

G-8 The new RS9-Thirty Automatic Oscillograph produced by **Hathaway Instrument Co.**, 1315 Souh Clarkson Street, Denver 10, Colorado, is claimed to give more channels, faster starting, more types of starting relays, sharper traces and lower expansion costs.

Applications include power generating station and distribution system monitoring.

Design features include 2-Millisecond Automatic Starting, four in-



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Antiseptic All-Purpose Skin Cleanser

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THEIR HANDS

Powered with ACTAMER* for Dermatitis Control

For easy filling of dispensers VI-LAN CLEAN is provided in polyethylene bags, thru which you may squeeze all or as much as is needed into the dispensers without waste.

Also available is a portable self-service unit, No. 815, equipped with 2 dispensers, 2 Scott industrial wiper brackets, plus a large waste disposal bin of large capacity.

For your convenience, VI-LAN CLEAN also is shipped in pint and quart can containers. Write NOW for descriptive folder and sample.

VI-LAN CLEAN is a degerming cleanser guarding your employees hands and bodies against irritation and infection.

VI-LAN CLEAN is fortified with ACTAMER*, evolved by the Monsanto Chemical Company. It is a potent bacteriostat that reduces resident skin bacteria by as much as 97%.

This emulsion paste cream does what soap and detergents can not do. Non-alkaline and acid free, and whether used "with or without water," it will not in any way effect the insulation value of rubber gloves. It controls dermatitis, and is a preventive of poison ivy and creosote burns.

VI-LAN CLEAN cleanses while it guards hands, face and body against skin contaminations; it removes greases, oils, paints, acids, expoxy resins, glues, printing inks, asphalt, thinners, crater compounds, rubber and gasket cements. It is non-irritating. It contains lanolin to restore natural skin qualities.

For safety's sake, for cleanliness, to prevent skin ailments and lost man hours, absenteeism and expensive compensation claims, give your employees the benefits of VI-LAN CLEAN.

Place VI-LAN CLEAN dispensers on your trucks and other service units, and the larger self-service units in all wash rooms and in critical on-the-job locations, to economize and to speed up your employees wash-ups. There is nothing like it anywhere.

DAMERON enterprises, inc.
427 So. 20th Street
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Check these features

- Micrometer torque seating switch gives tight valve closure, and protects valve parts from damage.
- Self contained unit—no gears, stem nut or bearings to buy.
- Weatherproof, dust-tight, watertight and explosion-proof construction.
- Hammerblow device . . . allows motor to reach full speed, before load is engaged.
- Non-rotating handwheel built into the unit.
- Automatic declutching.
- Motor is disengaged during handwheel operation.
- Can always be declutched for handwheel operation regardless of weather or electrical conditions.
- High torque motors.
- Simple valve yoke.
- May be mounted in any position.
- Three to four times faster handwheel operation.
- Actuation may be by any available power source such as electricity, air, oil, gas, water or steam. LimiTorque is readily adapted for microwave control.
- LimiTorque is designed for plug, butterfly, gate and globe valves up to 96" diameter . . . Entire Unit and nut can be lifted off valve yoke, by removing flange bolts.

Send for Catalog L-550 and see why this and other types of LimiTorque Valve Operators are so widely used.

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FLUID AGITATORS - FLEXIBLE COUPLINGS

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Equipment, Supplies & Methods (Cont'd)

ternal starting relays, two chart speeds, cartridge loading, choice of galvanometers, simplified optical system, digital date and time, two calibrating screens, convenience and accessibility.

Linings & Coatings for Corrosion & Abrasion Protec.

G-9 A complete rubber, neoprene and polyvinyl chloride factory applied lining and coating service for pipes, valves, tanks, ducts, vessels, etc., is being offered Southern industry by the **Radiator Specialty Co.**, 1400 West Independence Blvd., Charlotte 8, N. C.

Coatings provide protection against corrosion and abrasion in handling acids, bases, salts and fumes. Compounds may be made conductive or non-conductive, soft or hard, suitable for high or low temperature operations, etc.

Valves — complete lining and rehabilitation service on valves of all

Pipe and Fittings — All sizes or types. Individual sections or fittings can be relined for repair and replacement, or complete fabrications can be provided.

Dip-Coating — Special process dip-coatings on everything from funnels, trays and baskets to fans and metal parts requiring finish protection.

Tanks, Chutes, Ducts — Storage tanks, plating tanks, chutes, fume ducts, or complete ventilating systems.

As a local Southern source, company offers speedier service, lower transportation costs, and savings in maintenance and new installations involving such equipment.

Integral Strainer Steam Trap

G-10 The new No. 883 is the largest model of four cast semi-steel integral strainer steam traps manufactured by **Armstrong Machine Works**, Three Rivers, Michigan.

The integral strainer protects the trap from harmful sediment, scale or other foreign particles that may be present in steam lines. This trap is for use at pressures up to 250 psig. Capacity is 3500 to 4400 lbs/hr of condensate. Side inlet, side outlet, screwed pipe connections are furnished either ¾" or 1". Standard screen material is stainless steel, perforated .045" dia. holes, 226 per sq in. Other screen materials available.

The integral strainer feature saves on installation labor, requires less fittings and costs less than a trap and separate strainer. List price of the trap is approximately $34.00.

For More Free Data CIRCLE CODE NO. on the Handy Return Card — Page 17

Water Treatment Controller For Cooling Water Systems

G-11 For regulating mineral concentration and chemical feed in air conditioning and other recirculating cooling water systems, **Heller Laboratories**, 124 Fort Lee Road, Leonia, N. J., have developed the Hydrotrol.

The unit maintains a fixed range of mineral concentration and feeds chemicals accurately according to desired feed settings.

After the desired chemical feed and mineral concentration range are determined and set, the Hydrotrol operation is entirely automatic. Any range of mineral concentration, up to 100 cycles of concentration, can be maintained. A wide range of chemical feeds can also be maintained.

News for the South & Southwest (Continued)

(*Starts on Page 14*)

B & W—Charlotte District

Seth M. Snyder has been appointed manager of the **Charlotte, N. C.,** district sales office of **The Babcock & Wilcox Company's Boiler Division** according to S. T. Mackenzie, sales manager.

Seth Snyder

At the same time, Mr. Mackenzie reported that the company's Charlotte sub-office has been elevated to full district office status. The move, he stated, was made "to keep pace with the extraordinary development and growth of the Carolinas by providing better service for customers." The broader scope of the Charlotte office, he explained, will strengthen the company's relations with such leading cities as Raleigh, N. C., and Columbia, S. C.

Mr. Snyder joined B&W as a draftsman in Barberton, Ohio following his graduation from Ohio State University in 1936. Subsequently he worked in production, studied under the company's engineering apprentice program, and gained experience in the erection, service and contractual phases of the boiler business. In 1939, he joined the company's Atlanta, Ga., sales organization, and moved to the Charlotte sub-office in 1946.

The new district manager, a registered professional engineer in the states of North Carolina and Georgia, is a member and former section chairman of the A.S.M.E., and vice president of the Charlotte Engineers Club.

Johns-Manville—Miss.

Johns-Manville will enter the hardboard business, starting construction immediately of a 54,300 sq ft plant adjacent to its **Natchez, Miss.,** insulating board operations.

Entrance of Johns-Manville into the hardboard business is part of an expansion and improvement program on which the company expects to spend $26 million in 1956.

The new Natchez hardboard plant will have an annual capacity of 60,000,000 sq ft, provide employment for an additional 120 people, and add about $500,000 to the current Natchez annual payroll of $1,500,000.

Entrance into the hardboard business will further diversify the Johns-Manville line of building materials which currently includes asbestos-cement roofing and siding shingles; asphalt shingles, roll roofing and other asphalt products; insulating board products; asbestos-cement sheet materials; mineral wool insula-

BLACKMER PUMPS

fuel the **VISCOUNT** *planes*

Blackmer Rotary Truck Pumps are used by Shell for underwing fueling of Capital Airlines' new Viscount Planes.

Blackmer Bulk Plant Pumps are also being used by Shell for loading the trucks and at some airports for pit fueling.

OUTSTANDING FEATURES OF THESE PUMPS ARE:

compact design
full flow at engine idling speeds
built-in pressure control valves
non-metallic vanes — self-adjusting for wear
cartridge-type mechanical seals
heavy-duty anti-friction bearings
unusually high mechanical efficiency

BLACKMER PUMPS *liquid materials handling* ®

BLACKMER

INDUSTRIAL, HAND AND TRUCK PUMPS, STRAINERS, PRESSURE CONTROL VALVES

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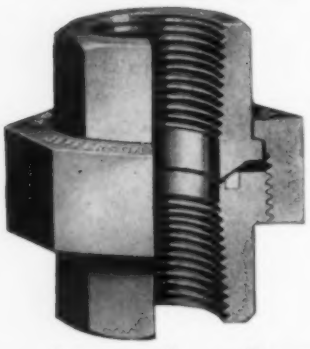
See Yellow pages for your local sales representative

ASK about the DEPENDABILITY of Jefferson A-4 PIPE UNIONS



...from the plants that use them

If you're interested in permanent leakproof performance (and what plant superintendent isn't), you can't help being interested in the dependability of JEFFERSON UNIONS.

One very important reason for this advantage in the use of JEFFERSON PIPE UNIONS is the fact that the male and female parts of the **ground** brass-to-iron joint, after having been machined in a true arc, are **ground together in pairs** and the parts thus mated, are never separated. Obviously this production procedure means a perfect match and assures absolute self-seating.

Other features include:

. . . the use of air-refined malleable iron in the bodies having a basic strength of 55,000 lbs. P.S.I.

. . . the brass seat ring located in a recess away from the runway . . . a feature exclusive with Jefferson . . . which means not only absence of obstruction to free flow through the fitting but also prevents pipe ends from coming in contact with the seat should pipes be screwed in too far.

. . . sufficient play in the ball joint to provide what might be called a universal joint to take care of any condition where pipes are not entirely in line.

These and other equally important features are well worth your investigation in plants that standardize on JEFFERSONS not only for dependability and leakproof performance, but also for ease of installation and economy in maintenance.

Explore the possibilities of the JEFFERSON line which includes 150#, 250# and 300# unions, union elbows, union tees and flange unions. Available with either brass-to-iron or iron-to-iron seats.

Get all the facts NOW. Literature FREE on request.

JEFFERSON UNION CO.

45 FLETCHER AVE.
LEXINGTON 73, MASS.

REMEMBER . . .
Ask Plant Engineers

News for the South & Southwest (Continued)

tions; acoustical materials; and asphalt and vinyl floor tile.

Hardboard is a hard wood sheet material made from pulpwood formed under high pressure and heat. It has wide application in the construction field and other industries.

Completion of the hardboard addition at Natchez is expected by the middle of 1957. The operation will require 15,000 additional cords of hard pulpwoods per year and provide an additional market for Natchez area tree farmers.

Chemstrand—Safety Award

In a ceremony marking the achievement of over 5 million safe manhours worked by its employees, the **Chemstrand** nylon plant at **Pensacola, Florida,** received a special safety award certificate from the State of Florida and an additional honor plaque from the Liberty Mutual Insurance Company. Fred G. Gronemeyer, plant manager, accepted the awards on behalf of the Chemstrand employees.

Electrical Contractor Florida Branch in Tampa

The A. S. Schulman Electrical Company, a nationally-known electrical contractor with offices in Chicago and Los Angeles, has opened a permanent office at 617 Memorial Highway in Tampa to cover its operations in **Florida** and the **Southeastern States.**

Founded in 1890 by A. S. Schulman, a pioneer in electrical research, the company is one of the oldest in existence for its type of work. It specializes in power wiring, transmission, and distribution for industries, public utilities, and major contractors. The company was the prime electrical contractor on the huge atomic installations at Oak Ridge, Tennessee, and Paducah, Kentucky. During the past ten years the company has done considerable utility work in Florida.

The company's widespread operations in Florida and the Southeast will be directed by **Evan Hinson.** Mr. Hinson, a resident of Terra Ceia, is well-known to the electrical industry in Florida.

Square D's Newest — $500,000 Electrical Equipment Assembly Plant — Atlanta, Ga.

Square D Company recently announced that it will construct an electrical equipment assembly plant in **Atlanta, Georgia,** as the base of expanded operations in the Southeast. Company's field engineering offices in **Georgia, Florida, Alabama** and other area states are also expected to be increased as the expansion program develops.

New $500,000 operation will be located in Atlanta's northwest section — on Marietta Boulevard south of Chattahoochie St. Designed to permit future additions, the 31,000 sq ft structure will house Square D's Atlanta regional headquarters offices as well as provide production facilities. James Vaughan, vice president of Square D Company, will direct construction of the new plant.

Square D is one of the nation's largest manufacturers of electrical distribution and control devices, including circuit breakers, switchboards and motor starters.

Boyer With G-E at Hickory

Samuel H. Boyer has been appointed foreman—plant facilities for the Distribution Transformer Plant of the **General Electric Company** in **Hickory, North Carolina.**

In this position Mr. Boyer is in charge of the Plant's gas, steam, and oil operations. Previously from Charlotte, North Carolina, Mr. Boyer is now living in Newton, North Carolina.

Before joining the **General Electric Company** last December he had been Plant Engineer in the textile industry.

C & B Distributor for Diaphragm Valves

The **Cameron & Barkley Company, Southeastern** distributor of industrial supplies, with branches at Charleston, S. C., Savannah, Ga., Jacksonville, Orlando, Tampa and Miami, Fla., has become an authorized distributor for **Grinnell-Saunders Diaphragm Valves.** C & B is already carrying the Grinnell line of pipe hangers and supports.

Grinnell-Saunders Diaphragm Valves are recommended for use where corrosion, abrasion, contamination, clogging, leakage or maintenance are problems, because the diaphragm completely seals off working parts of valve from the fluid in the line.

Wyckoff Representative

Wyckoff Steel Company, Pittsburgh, manufacturers of cold finished steels, has appointed **K. O. Brown & Company,** Greensboro, North Carolina, as their southeastern representative in the states of **North and South Carolina, Virginia** and **Eastern Tennessee.**

Appalachian Electric's Clinch River Plant

Ground-breaking ceremonies were recently held for **Appalachian Electric Power Company's** 450,000 kw Clinch River Plant at Carbo Bend, Russell County, Virginia. $55 million plant is scheduled for operation in late 1958.

Turbine-Generators — Plant will house two identical 225,000 kw General Electric generators.

Fuel — Two-unit plant is expected to burn 1,300,000 tons of coal yearly. Plant is situated in heart of Clinchfield Coal Corporation's vast southwestern Virginia coal reserves. All coal will be delivered by rail.

Boilers — Two outdoor-type Babcock & Wilcox boilers will provide steam at 2,000 psi and at a temperature of 1,050 F.

Cooling Towers — Towers, two for each unit, will be 281 ft long, 67 ft wide and 61 ft high with a capacity of 55,000 gpm.

Transmission — Three double-circuit, 132,000 volt transmission lines will feed the plant's power into the Appalachian and AGE Systems.

Resident Engineer — Earle T. Snodgrass, veteran AGE System supervising engineer, has been named resident engineer. He has had various construction engineering assignments at the AGE System's Tanners Creek, Philo, Twin Branch, Tidd and Philip Sporn Plants.

Here's how the 450,000 kw Clinch River Plant of the Appalachian Electric Power Company will look when completed in 1958.

THE RIGHT ANSWER
for greater productivity from machinery investments

Sterling ELECTRIC POWER DRIVES

The important distinguishing features of Sterling Electric Power Drives can bring greater productivity and cost reductions to your manufacturing operations. To help you meet the competitive challenge of mechanization and automation, Sterling offers power transmission equipment, variable speed or constant speed—manual or automatic controls—and an application engineering service. Together, these give your machinery the type of drive systems that will achieve maximum productivity at lowest cost.

Sterling Speed-Trol Variable Speed Motors
Sterling Slo-Speed Gear Motors
Sterling Constant Normal Speed Motors
Sterling Multi-Mount Speed Reducers

Write today for Bulletin No. 185. Discover the big advantages Sterling Electric Power Drives can bring to your plant.

STERLING ELECTRIC MOTORS
LOS ANGELES 22 • CHICAGO 35
CINCINNATI 37 • NEW YORK 51

Cameron & Barkley — Jacksonville, Florida

The **Cameron & Barkley Co.**, leading southeastern distributor of industrial supplies and machine tools, has announced the opening of executive offices in **Jacksonville, Fla.** The

R. C. Barkley

ninety-one year-old firm, with branches in Charleston, S. C., Savannah, Ga., and Jacksonville, Orlando, Tampa, and Miami, Fla., has been headquartered in Charleston since 1865. In explaining this new move, President Rufus C. Barkley stated that the tremendous industrial growth in Florida has made Jacksonville the geographical center of the area served by Cambar, as well as the most economical and efficient point for central stock of stainless steel and specialty metal products. Mr. Barkley's offices will be located in Jacksonville's new Prudential Building.

Another Unit at Gorgas for Alabama Power Company

Electric power generating capacity of **Alabama Power Company's** three thermal power stations will be increased to 711,250 kilowatts in 1957 upon installation of a recently ordered 165,000-kilowatt steam turbine-generator unit.

The ninth powermaker to be put in service in Gorgas will be manufactured by **General Electric Company's** Large Steam Turbine-Generator Department in Schenectady, N. Y.

A tandem-compound, double-flow, reheat type turbine will drive the generator. Steam will initially enter the turbine at 1800 psig at 1000 F. The generator is rated at 224,000 kilovolt amperes and will operate at 3600 rpm.

New Name for Brass Works at Birmingham

R. E. Schuler, President of **Anderson Electric Corporation**, formerly Anderson Brass Works, Inc., of **Birmingham, Alabama**, announced the change in corporate name.

The 30-year-old operation has been in the process of product redesign and greater diversification over a period of the last ten years. The Anderson product line of electrical power connectors, clamps, fittings and accessories is now the most complete line produced by any one manufacturer in the industry. Many of the new principles involving the use of aluminum and aluminum-alloy in connectors equipment now in wide use throughout the electrical power field were pioneered by Anderson.

L.O.F. Glass—Industrial Relations Manager

Donald L. McClure, formerly manager of the **L.O.F. Glass Fibers'** plant at Parkersburg, West Virginia, has been named to the newly-created post of Director of Industrial Relations of the company with headquarters in Toledo.

Borg-Warner and York

The Boards of Directors of **Borg-Warner Corp.** and **York Corp.**, in specially called meetings, have unanimously approved the affiliation of the two companies. The affiliation will be effected under a Plan of Reorganization whereby Borg-Warner will succeed to all of the assets and assume all of the liabilities of York.

President Eisenhower Honorary Member of ASME

Joseph W. Barker, president of The American Society of Mechanical Engineers, April 23 presented a certificate of honorary membership in the 41,000-member organization to President Eisenhower, who became the first U. S. President to be so recognized while in office. In a ceremony at the White House, Dr. Barker said the honor, highest offered by ASME, was "for acknowledged professional eminence in engineering," and recognized the recipient as "Soldier, Statesman and President; tactful and inspiring leader whose planning and administration contributed greatly to the winning of World War II and to the defense of the free world."

Witnessing the presentation were left to right: Lt. Gen. Levin H. Campbell, Jr., USA, retired; Eugene W. O'Brien, past President of ASME, Vice President of W. R. C. Smith Publishing Company; Vice Admiral Emory S. Land, USN, retired; Thomas A. Marshall, Jr., Assistant Secretary of ASME; Mrs. Joseph W. Barker; President Eisenhower; Joseph W. Barker, President of ASME, President and Chairman of Research Corporation; David W. R. Morgan, past President of ASME, Professor of Engineering at Drexel Institute of Technology; Clarence E. Davies, Secretary of ASME; Miss Kathryn Casey, Attorney for Federal Trade Commission; William L. Batt, past President of ASME, former President of S. K. F. Industries; Frank W. Miller, Vice President of ASME, Vice President of Yarnall-Waring Company; and Louis R. Caplan, Chairman of Washington, D. C. Section of ASME, Vice President of Parr Engineering Company.

OPERATING AIDS for the Man-in-the-Plant

FOR FREE INFORMATION — Circle code number on page 17 or 18

S-1 Gear Reducers

4-page Bulletin G-3, describing company's spiral bevel gear reducers — Type VB — for cooling tower fan drives, offers 13 horsepower rating tables for size selection calculations. — LUFKIN FOUNDRY & MACHINE CO., Lufkin, Texas.

S-2 Butterfly Valve

12-page Bulletin 456 describes a butterfly valve which shuts off completely against low pressure or vacuum, as well as the full line pressure for which it is rated. Original replaceable resilient seat is also the gasket between flanges.—KEYSTONE VALVE CORPORATION, 5325 Kirby Drive, Box 6716. Houston 5, Texas.

S-3 Package Type Boiler

Catalog A3-55 describes the package type Holmar water tube boiler, gas-oil or combination fired, and special units for coal firing; factory or field assembled; suitable for pressures up to 600 psig; 25 to 500 hp; 1,000 to 20,000 lb/hr.—VULCAN STEEL TANK CORPORATION, Box 5292, Tulsa, Oklahoma.

S-4 Steel Tank Maintenance

Pamphlet "Cleaning and Painting All Types of Repair Service" gives requirements for a complete maintenance job at the lowest possible cost for water tanks and other types of steel structures. — STEEL AND TANK SERVICE CO., 118 West 24th St., Charlotte, N. C. or 829 Clayton Ave., Nashville, Tenn.

S-5 Heat Transfer Medium

Bulletin No. 200 describes Thermon which offers low cost, excellent heat transfer, dependability, long service life, use in wide range of temperatures, no jacket pluggages or product contamination, good mechanical and thermal shock resistance, rapid delivery, adaptability, longer life from electric heaters and easy equipment maintenance. — THERMON MANUFACTURING COMPANY, 1017 Rosine Street, Box 1961, Houston, Tex.

S-6 Liquid Separation

Catalog describes Fram Liquid Separator filters space-saver units, scientific method of removing water from liquid hydrocarbons by filtration. Units engineered for easy installation and maintenance and are compactly designed for a wide variety of applications — up to 60 gpm. — WARNER LEWIS COMPANY, Box 3096, Tulsa, Okla.

S-7 Transformers

8-page bulletin describes design policies, materials and performance of transformers which are attainable as individual units or single-section unit sub-stations; in O.I.S.C., dry, nitrogen or non-inflammable liquid filled types; for outside or inside installation; with primary and/or secondary switchgear; in conventional or special capacities, voltage combinations, dimensions and/or tap arrangements. — ELECTRICAL SERVICE COMPANY, Box 1039, Greenville, Tex.

S-8 Centrifugal Pumps

Pamphlet describes company's complete line of "Vortex" Centrifugal Pumps for the chemical, paper, steel, textile, leather and other process industries. — LAWRENCE PUMP AND ENGINE CO., Lawrence, Mass.

S-9 Commutator and Slip Ring Maintenance

Handbook explains corrective measures for commonly encountered commutator and slip ring maintenance problems — injurious sparking, rapid commutator or ring wear, streaks or grooves on the collector surface, commutator slots filling, chattering, noisy operation, and hot brush shunts at normal loads. General maintenance procedure and ideal commutator and slip ring maintenance products are also discussed. — IDEAL INDUSTRIES, INC., Sycamore, Illinois.

S-10 Couplings

Catalog V-169-E illustrates and describes Browning Couplings, consisting of rigid and flexible types which include fixed bore type flexible, bushed type flexible, bushed type rigid, bushed type chain and the new line of Minimum Bore (Reborable) chain couplings. Complete specifications and horsepower rating charts are included on the various types of couplings. —BROWNING MANUFACTURING COMPANY, Maysville, Ky.

S-11 Automatic Regulating Valves

Bulletin 954 gives illustrations and specifications of various reducing valves, float valves, lever valves, back pressure and relief valves and temperature control valves. — KLIPFEL VALVES, INC., Division of Hamilton-Thomas Corp., Hamilton, Ohio.

S-12 Motor Control Unit

28-page Bulletin 2-2000 describes new 7"-high motor control units which permit

EXTRA YEARS

OF MORE DEPENDABLE POWER

and at less cost per pound of steam

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Operating Aids (Continued)

plug-in of as many as twenty NEMA Size #1 combination motor starters in a standard 90" back-to-back section. Construction, component, unit removal, dimensions, bus location, and floor plan data included. — FEDERAL PACIFIC ELECTRIC COMPANY, 50 Paris Street, Newark 1, N. J.

S-13 Carbide-Tipped Masonry Drills

Table gives recommendations, including speeds, drill sizes and pressure requirements, for applying carbide-tipped masonry drills in piercing cinder and cement blocks, brick, various tiles and stones and marble. — CARBOLOY DEPARTMENT of General Electric Company, Detroit 32, Michigan.

S-14 Plastic Pipe-Tubing

12-page catalog illustrates and describes line of corrosion-resistant polyethylene and polyvinyl chloride pipe, tubing, ducting, valves and fittings for industrial applications; more than two dozen photos and drawings supplement the text. — AMERICAN AGILE CORPORATION, Box 168, Bedford, Ohio.

S-15 Heat Exchangers

18-page Bulletin M-306 includes description of design specifications and construction details of units, tables of effective surface area available, tables of overall dimensions, thermal design data with tables of film co-efficients, pressure drops, fouling factors, and tube characteristics for solving the basic heat transfer equations. — THE LUMMUS COMPANY, Heat Exchange Division, 385 Madison Avenue, New York 17, N. Y.

S-16 Manual & Automatic Valves

Catalog "Manual and Automatic Valves for the Tough Jobs" gives illustrations and descriptions of valve line designed for the tougher, more difficult problems in automatic and manual valve operation. Included is data on automatic control valves, bellows seal valves, special design control valves, manual and automatic control valves, manual control valves, blow-down valves, blow off valves, and industrial hose valves. — P-K INDUSTRIES, INC., 27 Porete Ave., North Arlington, N. J.

S-17 Industrial Wire Rope

Bulletin No. DH-129D covers in 24 pages more than 120 different types of wire ropes used in construction, conveyors, cranes, dredges, railroads, steel mill and blast furnaces. Recommendations cover rope diameters, construction, preforming, lay, grade and core. Charts on weights and breaking strengths are included, along with photographs and drawings of typical wire rope riggings and accessories. — HAZARD WIRE ROPE DIVISION, American Chain & Cable Company, Inc., Wilkes-Barre, Pa.

S-18 Abrasive Wheels

36-page booklet "Mounted Wheels" gives information on maximum operating speeds for abrasive mounted wheels. Rules for safe and efficient operation and information on standard sizes of mounted wheels, together with standard mandrel sizes applicable for each, silhouette drawings of popular standard sizes of mounted wheels, designation system and eight "maximum speed" tables are included in the booklet. —GRINDING WHEEL INSTITUTE, 2130 Keith Building, Cleveland 15, Ohio.

S-19 Ceramic Tools

Catalog 56-C illustrates and describes Wendt-Sonis tool holder, clamp screw, clamp, chip-breaker, AlSiMag ceramic inserts and solid carbide shims. Also gives holder dimensions and prices of positive and negative tool holders, ceramic inserts and chip breakers. — WENDT - SONIS COMPANY, Tenth & Collier Streets, Hannibal, Mo.

Atomic Energy

(*Continued from Page* 54)

can be carried out with this reactor.

Aircraft — Georgia & Texas

The world's largest research and development center for atomic-powered aircraft will be built near Dawsonville, Georgia by Lockheed. A contract, running into millions of dollars, was recently awarded by the Air Force to Lockheed for the development of nuclear powered airplanes. It is expected that the contract will carry the work into the indefinite future.

A similar contract was awarded to Convair Division of General Dynamics Corporation. The existing facilities of Convair at Fort Worth, Texas will be used for carrying out the development work. General Electric Company will develop the nuclear engine for the Convair plane and Pratt & Whitney Aircraft Corporation will design the engine for the Lockheed plane.

Private Atomic Power Defended

Walker L. Cisler, president of Detroit Edison, has defended progress made by private industry in

the development of nuclear power. Progress in the utilization of nuclear energy for power purposes, by private power companies, has been the object of sporadic attacks from some quarters. Mr. Cisler stated that we have made remarkable progress considering the newness and complexity of the situation. He said we are further advanced than other nations. Among the accomplishments in the last ten years he cited the establishment of the Atomic Energy Commission laboratories, successful operation of small experimental reactors for a period of time sufficient to establish their technical reliability, and the training of a pool of trained specialists.

Louis V. Sutton, president of Carolina Power and Light Company, has warned utility executives that efforts to have the Federal Government build eight nuclear reactors are really an attempt to create another Tennessee Valley Authority. According to Mr. Sutton there are forty-five bills before Congress which could affect private power companies.

Compressor Maintenance

(*Continued from Page* 47)

the side of the engine room. The pipe leading to the riser should be made to provide a drain for condensation at the lowest point.

The receiver of compound steam cylinders must be drained. When doing this, drain should always be opened before starting, and live steam turned into the receiver through a bypass valve. The receiver, as well as the steam cylinders, should be thoroughly warmed by live steam before starting. An automatic condensate trap should always be used.

If a condenser is also used, the main exhaust pipe should be connected to it, but there should also be an opening to the atmosphere provided with an automatic relief valve. A stop valve should be placed in the exhaust pipe between the condenser and relief valve. Exhaust piping should drain toward the condenser, and if there is any low spot, as in a barometric condenser installation, a drain must be connected to a trap or to a collecting tank arranged for drainage while the unit is operating.

Building Volume Cut

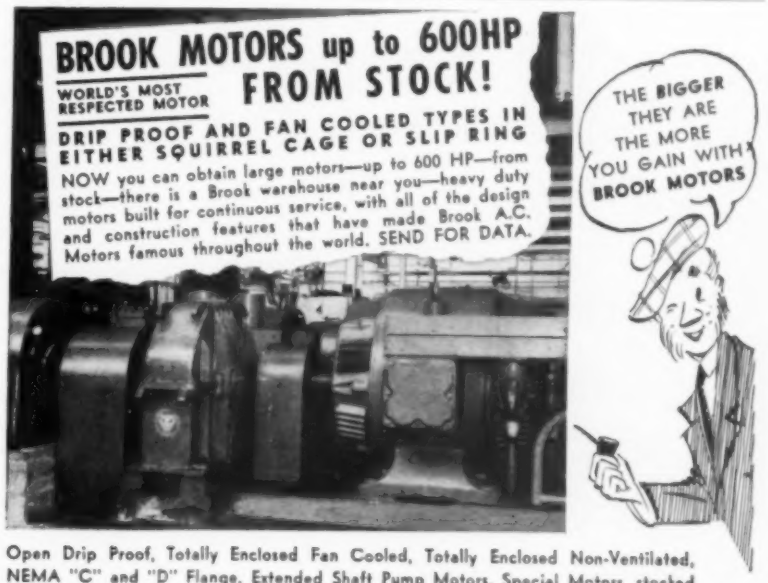
(*Continued from Page* 41)

pressed interest in applying their investigations of axial exhaust machines to obtain lower exhaust loss with a given last stage bucket. Here seemed to be the answer to reducing building volume and cost, so detail studies of installed cost of tandem machines and cross compound axial exhaust machines were made.

Several interesting facts of economic advantage in the use of a cross compound axial exhaust machine resulted. First, the turbine foundation was less costly, the condenser room pit depth was reduced, and the turbine room crane span was considerably shortened. Second, the savings of all these items more than offset the increased machine cost. Third, the use of the cross compound axial exhaust combination would result in a lower heat rate at the Saluda Hydro site.

The cross compound arrangement consists of a 3600 rpm high pressure reheat turbine, and an 1800 rpm low pressure turbine, close coupled on a common foundation. The unique feature of the low pressure turbine of course, is the axial exhaust of the steam. This feature is expected to give a maximum gain in overall economy of a cross compound unit of approximately 0.6 percent, depending on length of last stage buckets and the design of the exhaust hood at optimum condenser volume flows. This gain, on a given unit, is reduced at condenser volume flows greater or smaller than optimum, and approaches zero at very high volume flows.

By diffusing the kinetic energy in the steam stream leaving the last stage buckets, the axial-flow exhaust hood produces a static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pressure at the exit of the last stage buckets which is lower than the pressure in the condenser. In addition to partially regaining the kinetic energy in the steam, the coaxial arrangement of the turbine exhaust and condenser reduces the losses encountered in the conventional elbow type exhaust hood.

It is obvious that the condenser inlet diffuser and turbine exhaust diffuser design must be very carefully coordinated to result in the optimum overall performance. To this end extensive model testing was done both by the turbine manufacturer and by Westinghouse who is supplying the condenser complete with inlet diffuser.

Connecting a generator to one end of a turbine and a condenser to the other end presents some novel problems. In the first place, there seems to be no place left for a normal end standard, so the number 1 bearing, governors, control devices, and supervisory instrument detectors were mounted in a cylindrical enclosure in the center of the exhaust steam flow path. This cylindrical enclosure is of double wall construction with the intermediate space vented to the atmosphere to prevent oil leaks directly into the condenser.

The last stage buckets are 38" long and the 14 ft diameter of the last stage provides a 7 ft diameter for the cylindrical enclosure. This enclosure and #1 bearing are supported by hollow radial struts to the exhaust hood. The hollow struts provide space for bringing out the wiring, piping and control rods. The complete exhaust hood is supported on the foundation by longitudinal feet welded to the stiffening ribs. The condenser is supported on vertical flexible columns at the centerline of the turbine axis and flanges directly to the turbine hood. The turbine blowout diaphragms are mounted on the condenser.

Heaters

The final heat balance for this station utilizes four low pressure heaters, one deaerating heater and two high pressure heaters. Looking critically at conventional design with horizontal heaters, the long piping and physical location on an intermediate level between the operating and condenser floor we realize that much was to be gained by using vertical heaters arranged for minimum piping and located for convenient use of the turbine room crane.

All of the closed heaters are being furnished by Westinghouse. The high pressure heaters will have 70-30 cupro-nickel tubes welded into a 9 inch thick carbon steel tube sheet, and will incorporate desuperheating, condensing, and sub-cooling sections. The shell and channel head flanges will have a welded seal joint to eliminate gasket problems arising from transient operating conditions, and all heaters will be installed with the channel heads down.

Pumps, Fans, Controls

Boiler feed pumps in the larger high pressure units have become more and more of a problem, not only from power requirements, but also from divorcing operating mental hazards from economic considerations. For our particular set of circumstances we selected, as the most economical, three half capacity 5000 rpm pumps with step-up gears, magnetic couplings and 1800 rpm, 2500 hp electric drives. The pumps and gears are supplied by De Laval, the magnetic couplings by Electric Machinery Company and the motors by General Electric.

Three element feedwater control as well as steam temperature control, electronic combustion control and instrumentation is being supplied by Republic Flow Meter Company. The two forced draft and two induced draft fans being supplied by Sturdevant have Electric Machinery Company magnetic couplings driven by General Electric motors.

Electrical Aspects

As to the electrical aspects of this station, the 3600 rpm turbine drives a 96,000 kva 85% pf generator and the 1800 rpm turbine drives a 76,800 kva 85% pf generator. Each generator is separately excited and solidly connected to a 175,000 kva 3 phase 13.8/115 kv forced oil water cooled transformer. The generator oil circuit breaker is on the 115 kv side of the step-up transformer and connects the steam plant with the existing hydro plant substation bus.

Start-up station service is obtained from a 12,500 kva 115/4.16 kv transformer, while normal station service is supplied by a 12,500 kva 13.8/4.16 kv transformer on the generator leads. The start-up station service is designed for use by any machine of the ultimate plant.

Water

Condenser cooling water is obtained from and returned to the lake by tapping the surge tank risers of two hydro machine penstocks. By the use of cross over valving and a free discharge into the tailrace, either of the penstocks can be taken out of service for maintenance. The full lake elevation of 360 ft and the condenser elevation of 225 ft make it necessary to design the cooling water piping and condenser water box for 125 psi service. The temperature of the cooling water is fairly constant with observed

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variations of less than 10 from an average of 50 degrees F. The use of circulating water piping instead of the conventional intake structure, screen house, and intake and discharge tunnels have resulted in a further economy of construction.

Raw water from the lake is precipitated, filtered, and demineralized for boiler feed make-up. A closed cooling water system for the small heat exchangers reduces the capacity of the initial water treatment substantially. The demineralizer is of the two bed type having a capacity of 100 gpm.

Personnel

All essential operating equipment will be under the full control of a single operator in the central control room. It is planned to have not over two additional shift personnel to operate the first unit and further economics are possible with a two unit setup. Except for start-up and shutdown of a unit their entire time will be devoted to inspections and minor adjustments. It is proposed to eliminate log readings by use of an automatic logging device.

The various items of plant equipment were arranged to make maximum use of their individual design considerations and also to present localized areas of operating activities for two units. The bunkers for the second unit are alongside those of the first unit and between the two boilers. This allows the feeders to be located on the operating floor in close proximity. The mills are also located in a group on the lowest elevation. The boiler burners are located on the operating floor to eliminate additional platform steel and grating.

Reduced Building Volume

By carefully coordinating the physical arrangement with operating requirement we have obtained substantial reductions in building volume compared with our last installed unit at Urquhart. Since the Urquhart #3 unit is a 100 mw nameplate, 1800 psi, 1000 F throttle with 1000 F reheat, it is felt a fair comparison with McMeekin #1 can be made.

If the McMeekin boiler were totally enclosed the first unit requires a building volume of 15 cu ft per kw compared with the Urquhart #3 volume of 25 cu ft per kw. Likewise, the McMeekin building steel, exclusive of the office annex, amounts to 495 tons less than that used in Urquhart #3. In spite of the large reduction in overall plant height it was possible to design the McMeekin unit with the same area at the operating floor.

Cost Savings

The cost of the first unit at McMeekin is expected to be approximately $10 per kw less than our conventional design. Some of the cost savings factors as enumerated above are obvious, however, several other factors which should reduce cost further do not lend themselves to definite evaluation.

Due to the lower boiler height it is expected that a larger part of the boiler can be shop fabricated to reduce field labor, and also a lower erection cost is possible from the shorter distance the material must be handled. Due to the compactness and arrangement of the equipment, less auxiliary piping should be required. Also this arrangement reduces the length of power cables and control circuits compared with our conventional construction.

The first unit of the McMeekin station is expected to be in operation in the first part of 1958.

The General Engineer

(*Continued from Page* 61)

the first page. Plan your reports so that the information necessary for making executive decisions is on the first page. If the manager reads this first page, he should have all necessary facts for his decision. True, if he is interested he should be able to read further into the report for complete details.

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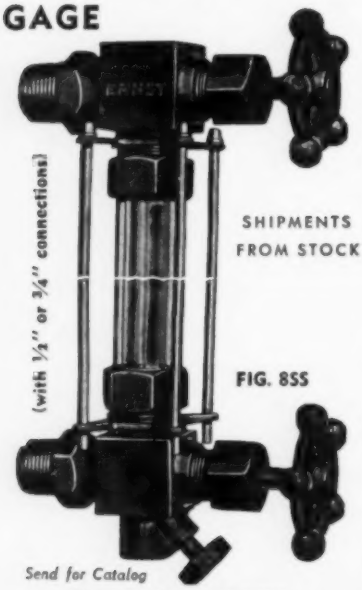

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The further you read the less important the information becomes.

Executives do not read reports for relaxation or pleasure. They read them in order *to obtain information*. Give them the information, do not tease or frustrate them with long and meandering reports.

Speaking is another form of communication which is not often used to advantage by engineers.

Engineers are often expected to explain their ideas or test results to individuals or to groups of people. Training in public speaking is a must in college, but experience in speaking is also a must if one is to develop this ability.

Speaking ability is best developed by practice. Many engineers find that civic clubs and religious activities offer opportunities for developing the ability to speak. If you are offered the position of club president or Sunday School teacher, take it because it is one of the best ways to learn to think and speak on your feet.

ABILITY TO VISUALIZE:

The best engineers have developed an ability to "think in three dimensions." They can literally build a machine, conveyor, or other device in their mind and then "turn the wheels" to see if it will operate satisfactorily.

The power to visualize is developed by training in such courses as descriptive geometry and also by *using this faculty*.

This power to visualize is not limited to physical things such as nuts, bolts and gears, but it may also be applied to more abstract thinking.

The ability to mentally visualize a problem and its solution is closely akin to imagination and creative thinking.

GENERAL KNOWLEDGE:

The plant engineer is expected to be a good all-round general engineer. He must be acquainted with many fields such as heating, ventilating, and air conditioning, machine design, maintenance, power plant engineering, stores engineering, replacement engineering, methods and standards work, and a great variety of related problems that have to do with construction and operation.

Many of these fundamentals are learned in technical schools, but the application of them must be learned by practice.

Summary

Management expects two things from its engineers: knowledge of how to work with people and technical knowledge.

In present-day practice the human factor is the more important, and it is also the one which is most neglected in our schools.

This means that each engineer must depend more heavily on experience and practice for knowledge in the field of human relations.

Management wants an engineer it can absolutely rely upon. He must have integrity first and technical ability next. The latter is of little use without the former.

He should be willing to work, and willing to put out his best whether he feels he is being paid for it or not.

The engineer must always remember that next year's promotions are decided this year. Each man is on trial now and is being watched. Opinions are being formed day by day. Then when an opening does occur, management usually has a man in mind for it who by his attitude, ability and performance has already qualified himself for the new opening.

What will a coin buy if one side is gold or silver, but the other is lead?

Suggested Reading:

"The Engineer Goes Into Management" by Wm. B. Given, Jr. — *Harvard Business Review*—January-February, 1955

"The Unwritten Laws of Engineering" by W. J. King — *American Society of Mechanical Engineers* 29 West 39th Street, New York

"How to Manage Engineering Personnel" by Samuel Storchheim — *Mechanical Engineering* — September, 1954

"The Practice of Management" — Peter Drucker — *Harper and Brothers*, New York, 1954

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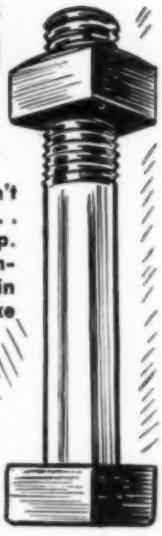

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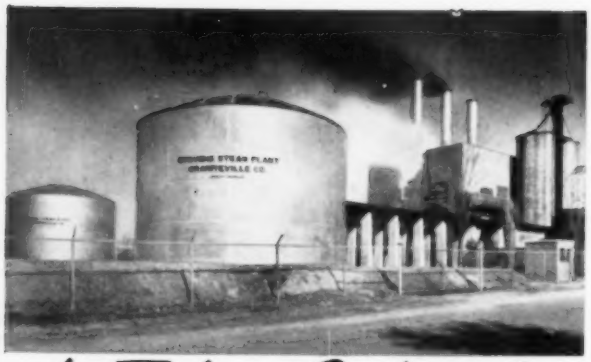

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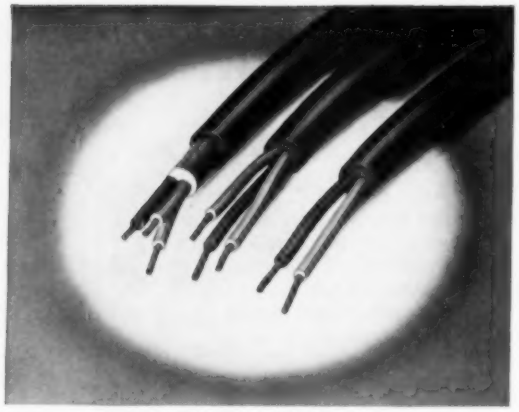

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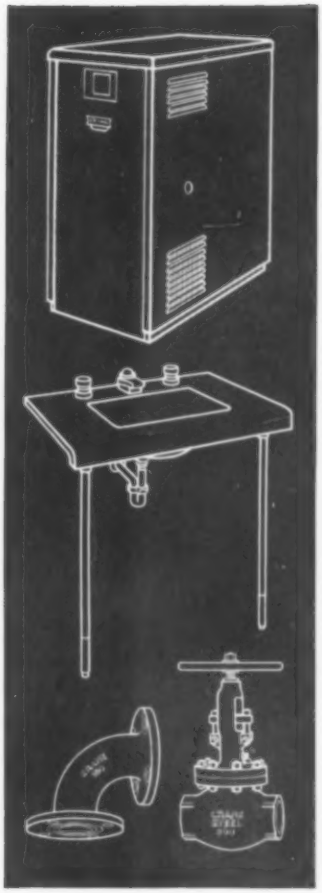

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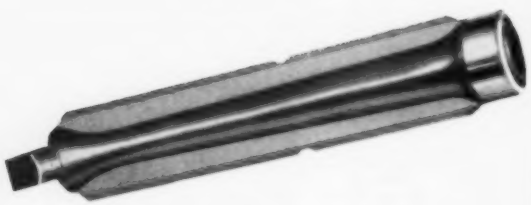

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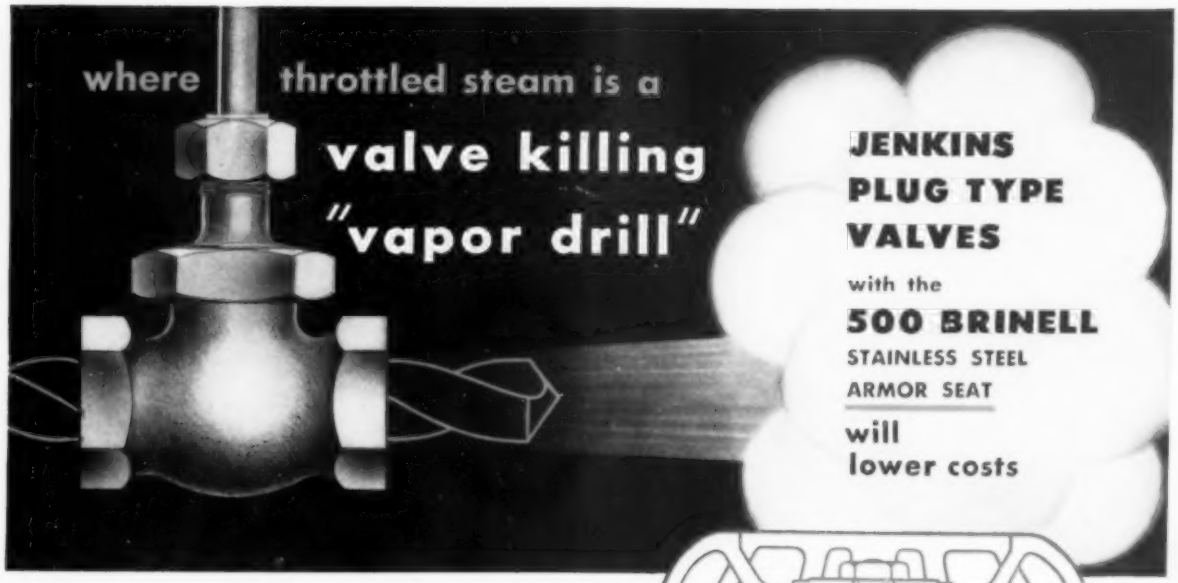

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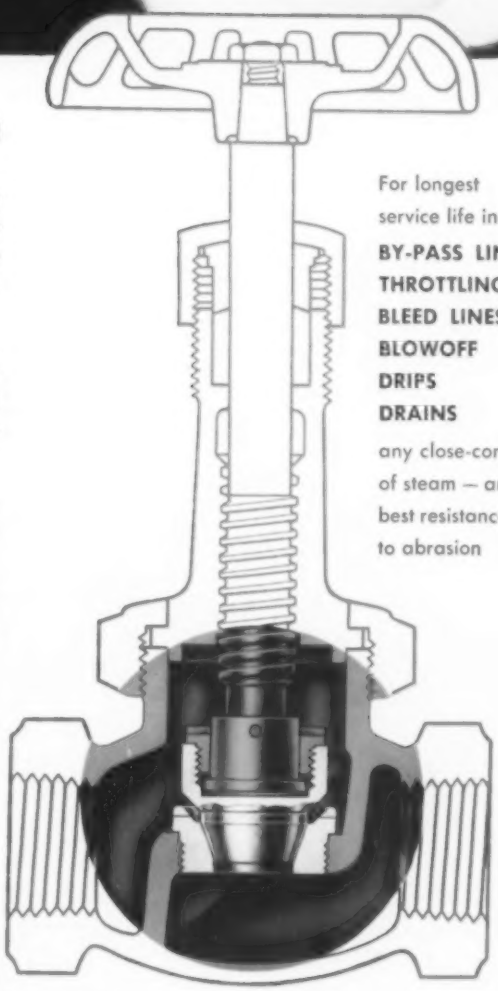

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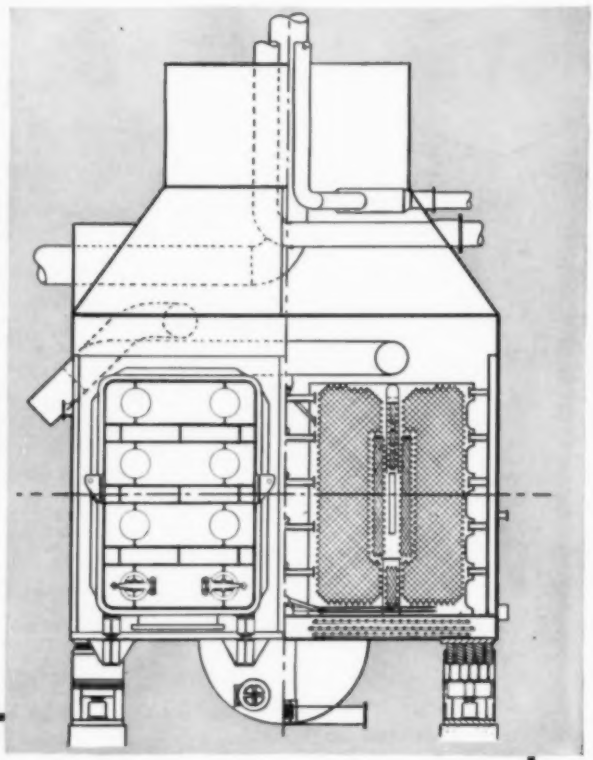

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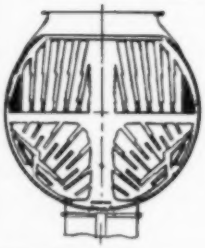

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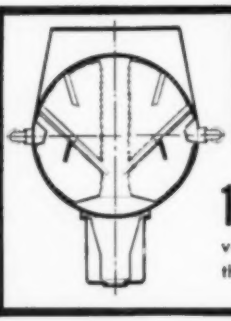

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